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HARVEST ESTIMATES FOR SELECTED SPORT FISHERIES IN SOUTHEAST ALASKA IN 1986

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ABSTRACT

Creel surveys of major saltwater and freshwater sport fisheries in southeast Alaska were conducted during 1986. In the marine fisheries, aerial boat counts and dockside angler interviews were used to estimate effort and harvest of salmon, halibut, rockfish, trout, and char. Freshwater roadside and saltwater shoreline effort and harvest estimates were obtained through creel surveys based on completed trip or roving survey designs. For both marine and freshwater fisheries, angler interviews also provided catch rates for selected species by gear type. Scale samples were taken and lengths were measured on chinook salmon (*Oncorhynchus tsawytscha* Walbaum) caught by marine anglers and used for age and size composition estimates. The contribution of hatchery and wild stock chinook and coho salmon (*Oncorhynchus kisutch* Walbaum) to the recreational fisheries was estimated from analysis of coded micro-wire tag recovery data.

An estimated 15,300 chinook salmon were harvested by marine anglers during 1986 in the surveyed fisheries. This compares with approximately 15,000 chinook salmon taken in the same fisheries during 1985 and approximately 12,000 chinook during 1984 and 1983. Chinook and coho salmon catch rates were below average in the Juneau marine fishery, while Ketchikan marine anglers had above average catch rates for chinook, coho, and pink salmon (*Oncorhynchus gorbuscha* Walbaum). Of the 15,300 chinook salmon harvested in the surveyed fisheries, approximately 20 percent were produced by hatcheries. The largest contributors of hatchery chinook were the Crystal Lake (Alaska Department of Fish and Game, ADF&G), Little Port Walter (National Marine Fisheries Service, NMFS), and Neets Bay (Southern Southeast Regional Aquaculture Association, SSRAA) hatcheries. The majority of hatchery coho salmon were produced by the Whitman Lake and Neets Bay Hatcheries (SSRAA) near Ketchikan.

Chinook salmon CPUE (chinook caught per rod-hour) was compared for those anglers using downriggers versus other types of sport fishing tackle and for anglers trolling versus drifting or anchoring their boats. Anglers trolling for salmon with downriggers had catch rates up to three times higher than did anglers using other types of fishing tackle.

KEY WORDS: Creel survey, angler effort, harvest, sport fishery, roadside, marine, derby, hatchery, enhancement, tag, chinook salmon, coho salmon, pink salmon, sockeye salmon, chum salmon, halibut, Dolly Varden, steelhead trout, cutthroat trout, rockfish, Juneau, Ketchikan, Petersburg, Wrangell, Haines, Sitka, Yakutat, Southeast, coded micro-wire tag, age composition.

INTRODUCTION

The waters of southeast Alaska (Figure 1) support important commercial, recreational, and subsistence fisheries for a variety of salmon and

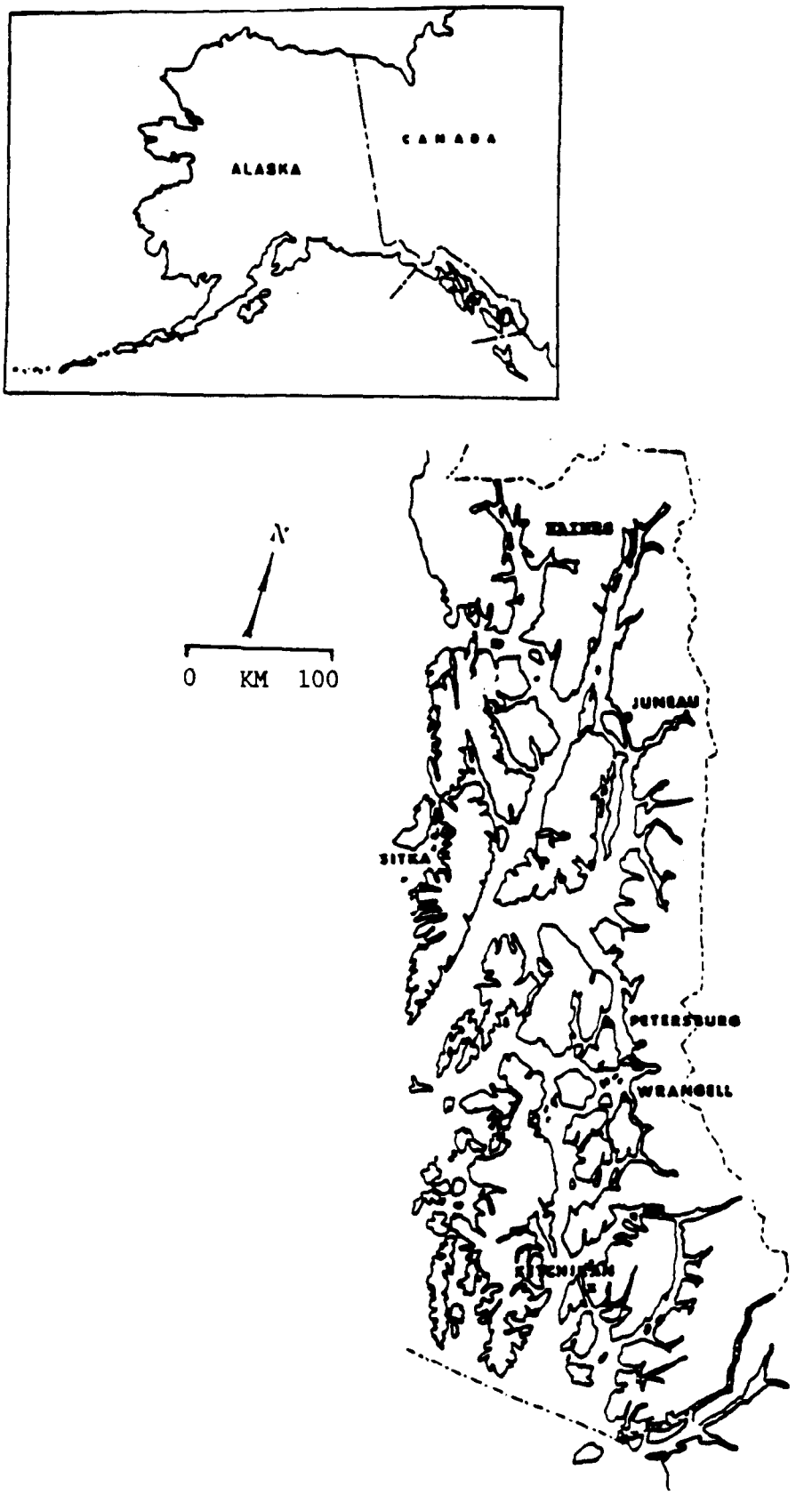

Figure 1. Communities in southeast Alaska where sport fish creel surveys are conducted.

bottomfish species. The largest sport fishery in Southeast is the Juneau marine fishery which accounts for an average of 35 percent of the total marine angling effort (Mills 1986). Although smaller in size, other important marine fisheries occur around Ketchikan, Petersburg, Wrangell, Haines, and Sitka. In addition, there are many important freshwater sport fisheries in Southeast, including the Situk River near Yakutat and the Chilkat and Chilkoot Rivers near Haines.

On-site creel surveys of the Juneau marine sport fishery (Figure 2) have been conducted every year since 1960 (Mattson 1975; Schmidt and Robards 1973, 1974, 1975; Robards 1976, 1977, 1978; Marriott et al. 1979; Schwan 1980, 1981, 1982; Neimark and Schwan 1983; Neimark 1984, 1985; and Mecum and Suchanek 1986). Marine sport fisheries in Ketchikan, Petersburg, Wrangell, Haines, and Sitka, and freshwater fisheries in Juneau, Haines, and Yakutat (Figures 3 through 8) have only been surveyed on a regular basis since 1983. Creel survey information is used for a variety of management and reporting purposes. The recently enacted U.S./Canada Pacific Salmon Treaty requires careful monitoring of commercial and recreational harvests of chinook salmon. Inseason and post-season estimates of the harvests of wild and hatchery chinook salmon stocks by marine sport fisheries in Southeast are needed to monitor Alaska's compliance with catch limits established by the Treaty. New sport fishery enhancement projects funded through the expanded Dingell-Johnson Federal Aid program were initiated in 1985. Expanded and improved creel sampling programs are critical in determining the effectiveness of these enhancement efforts.

Weekly catch rates for coho salmon in marine fisheries are used by management biologists from the Division of Commercial Fisheries to monitor the relative abundance and migratory timing of coho salmon in coastal waters. In the Situk River fishery, inseason estimates of the sport harvests of chinook, sockeye, and coho salmon are used, along with commercial and subsistence harvest data, to determine the need for emergency closures to ensure adequate escapements of these species. Creel survey information is also provided to the state of Alaska Board of Fisheries and the International Pacific Halibut Commission (IPHC) during their consideration of proposed modifications of regulations affecting sport fisheries.

The following objectives are addressed by the research summarized in this report:

1. To estimate the total angler effort and the total harvest of salmon, halibut, rockfish, trout, and char in the Juneau (15 April to 15 October 1986), Ketchikan (15 April to 15 September 1986), Petersburg, Sitka, Wrangell (15 April to 30 June 1986), Haines (15 April to 12 July 1986), and Yes Bay (1 May to 15 August 1986) marine sport fisheries.

2. To estimate the number of wild and hatchery chinook and coho salmon harvested in Juneau, Ketchikan, Petersburg, Wrangell, Haines, and Sitka marine sport fisheries during the dates listed in objective 1.

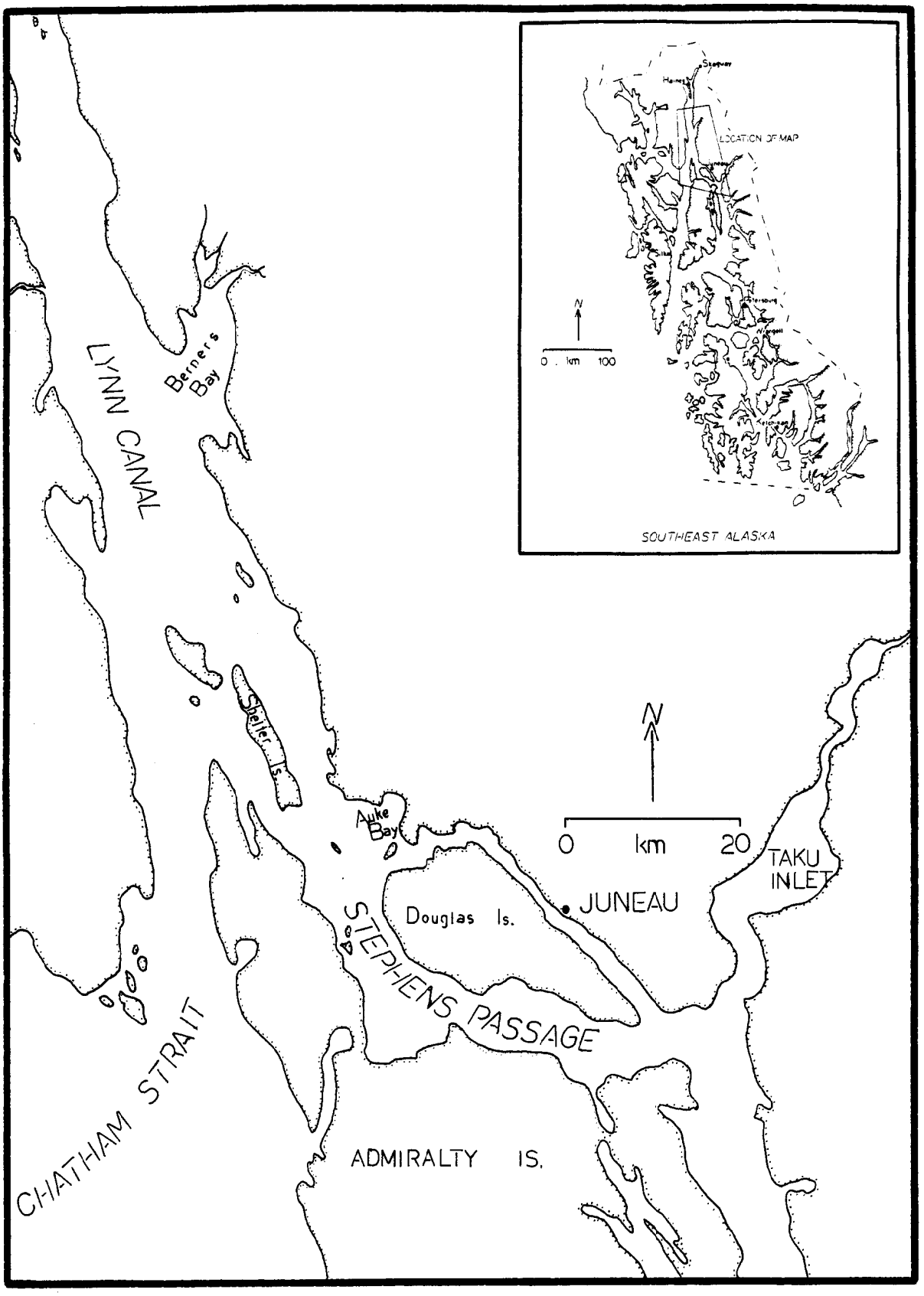

Figure 2. Juneau marine sport fishing grounds.

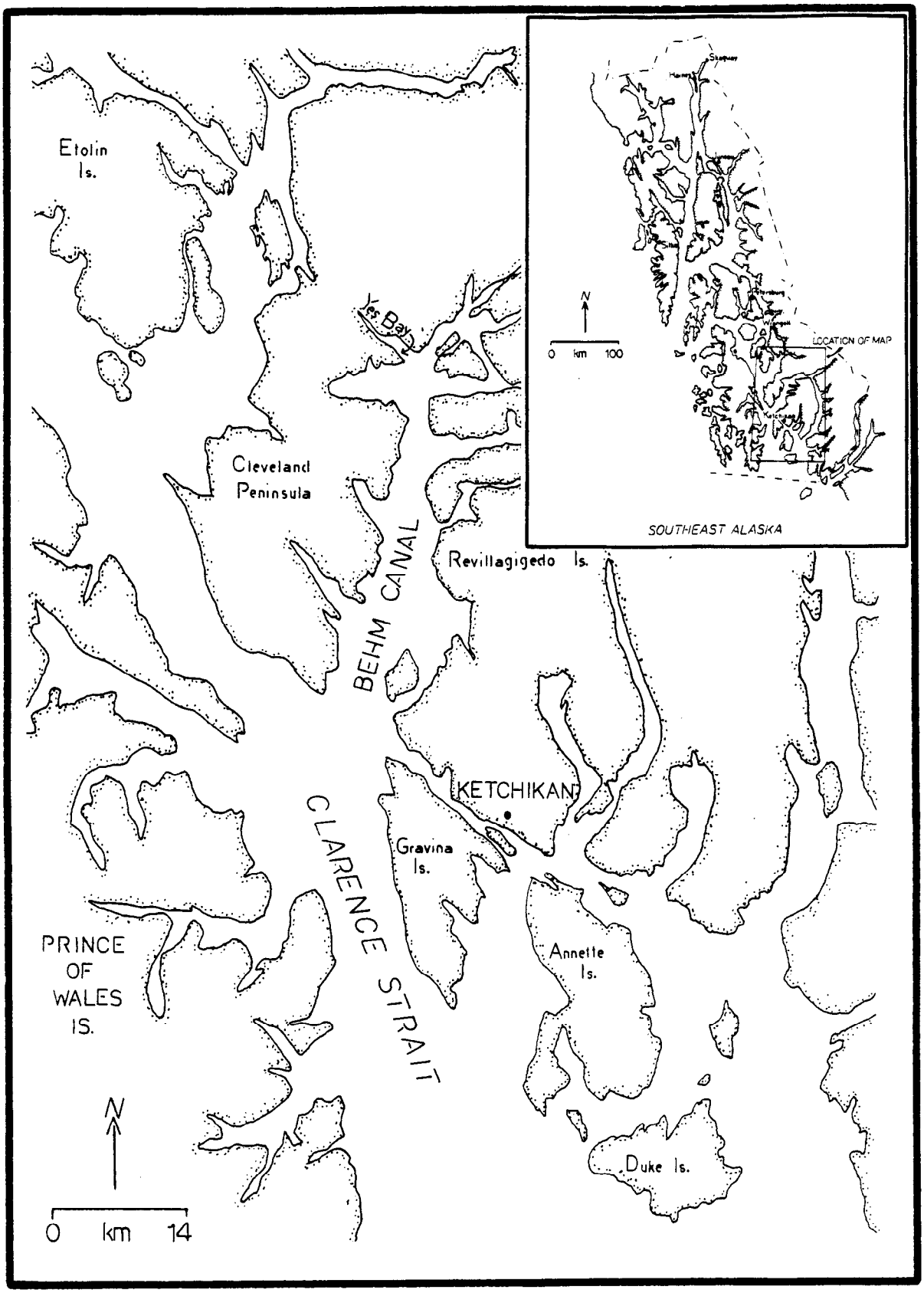

Figure 3. Ketchikan marine sport fishing grounds.

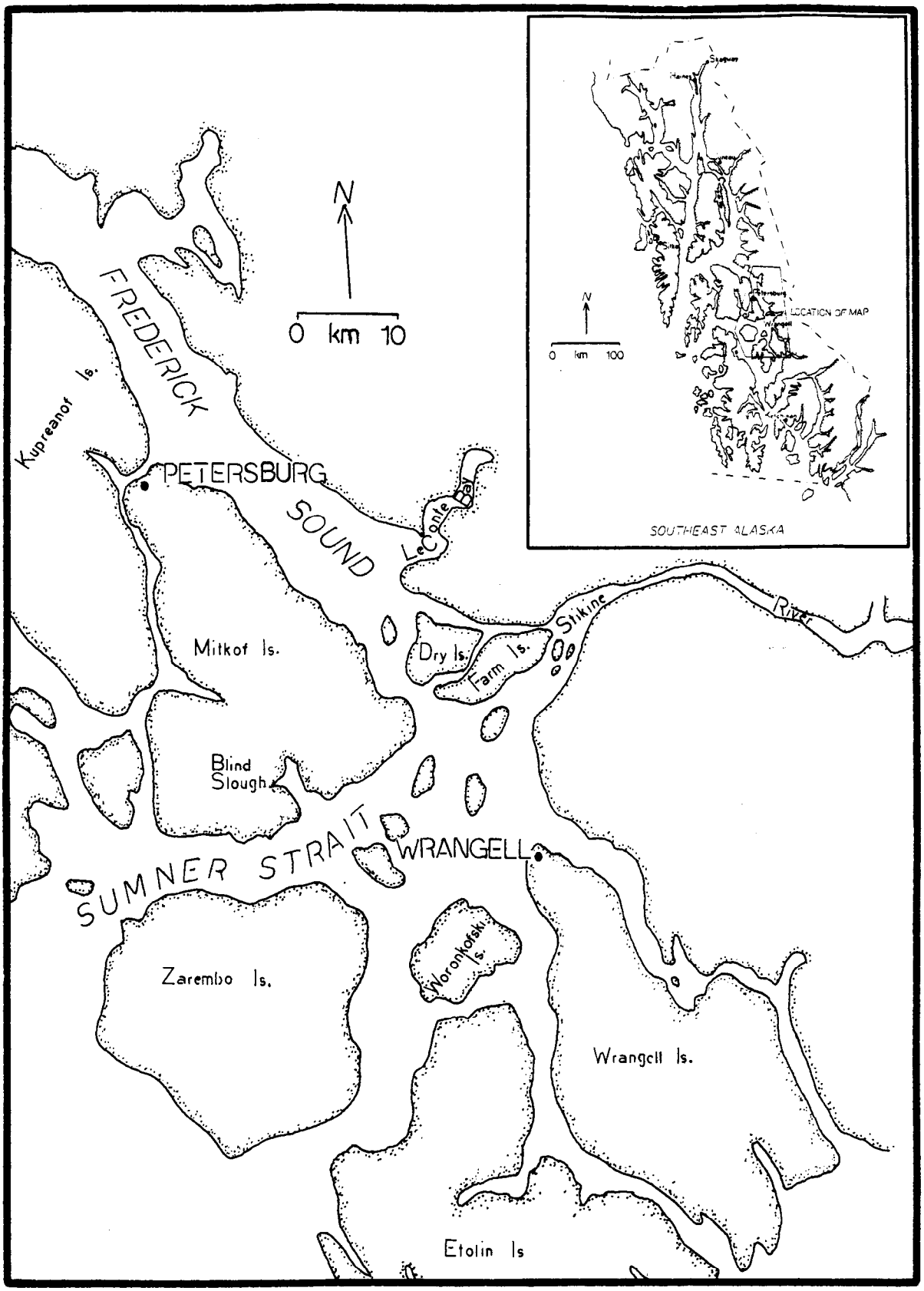

Figure 4. Petersburg and Wrangell marine sport fishing grounds.

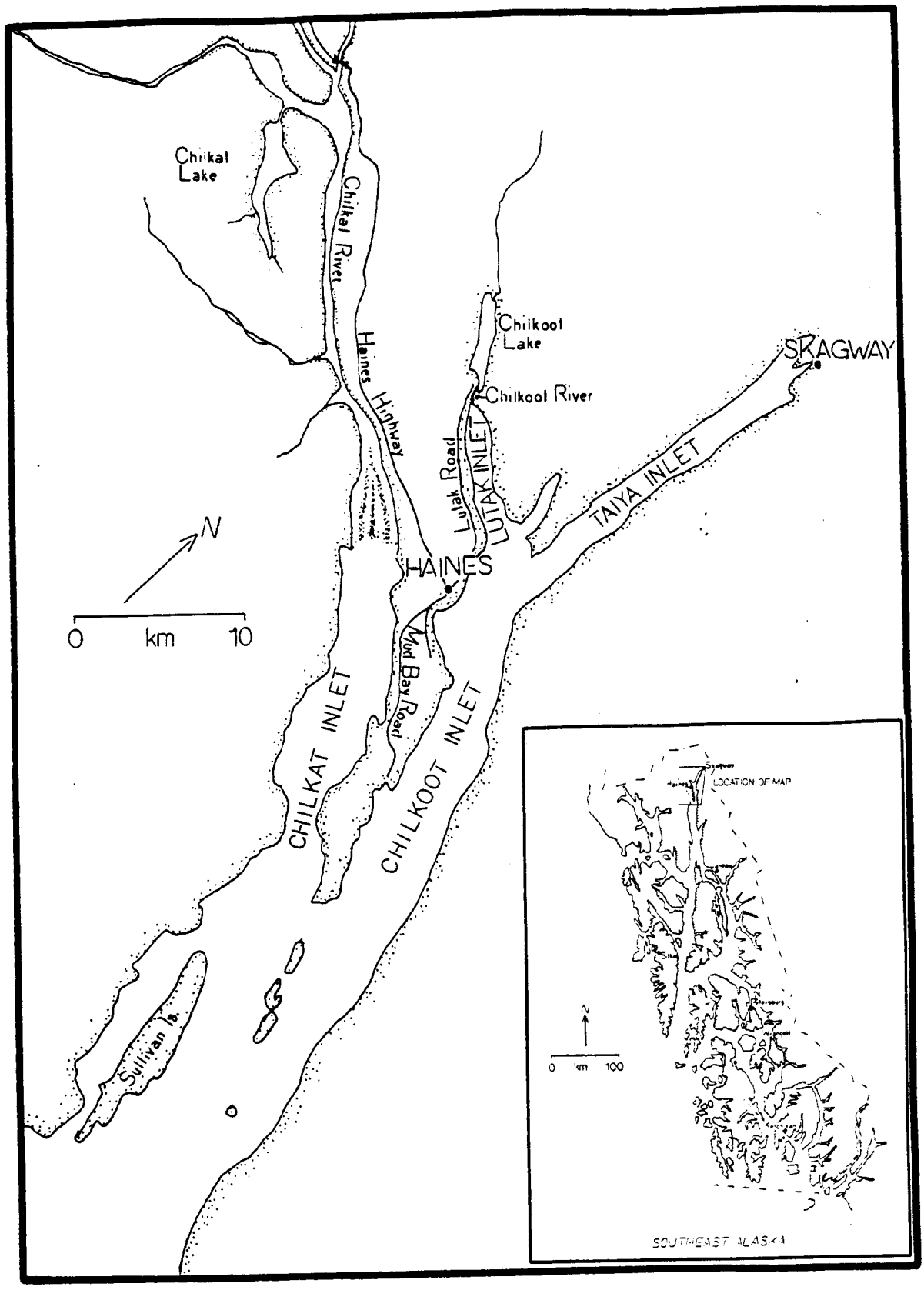

Figure 5. Haines marine and freshwater sport fishing grounds.

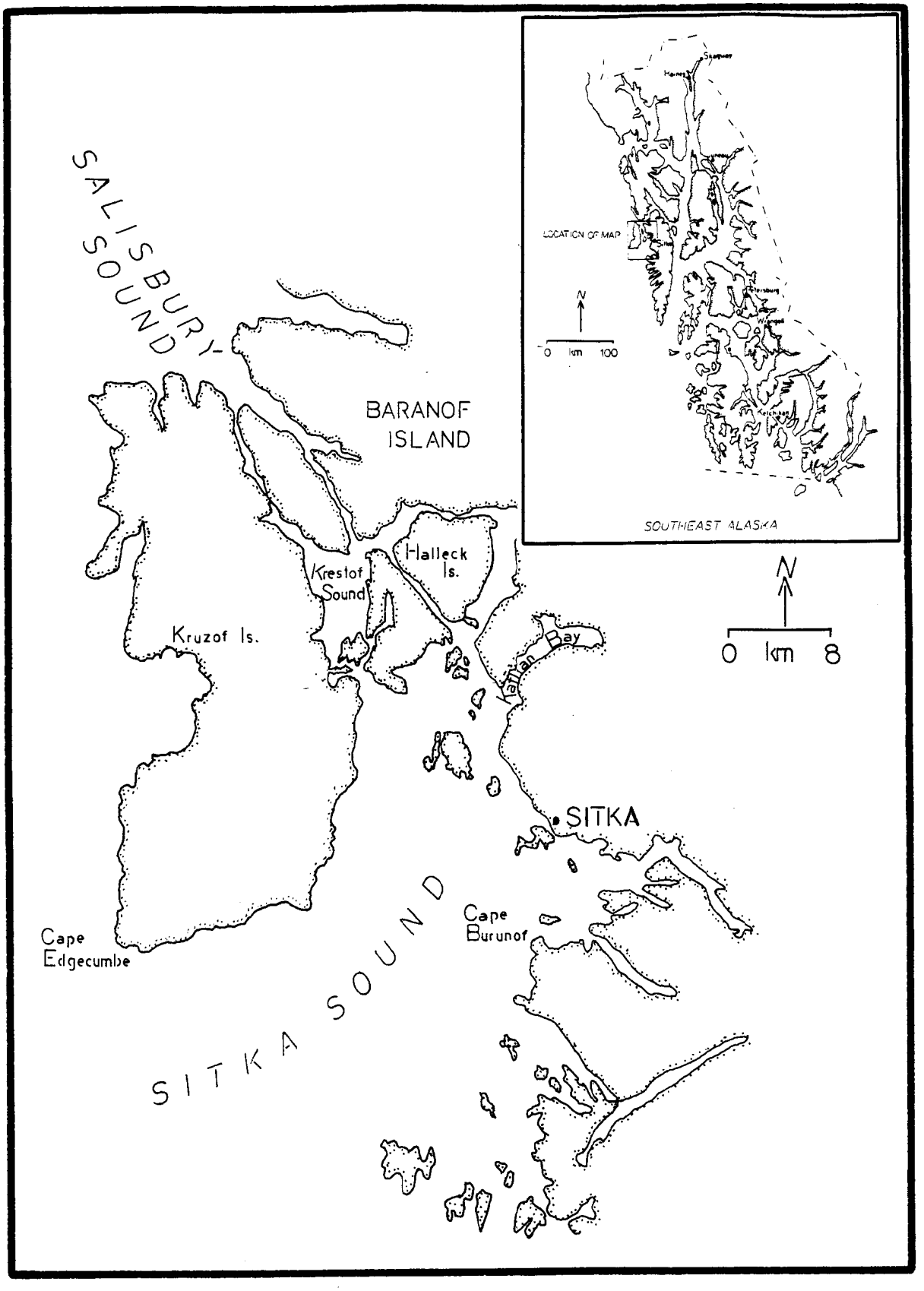

Figure 6. Sitka marine sport fishing grounds.

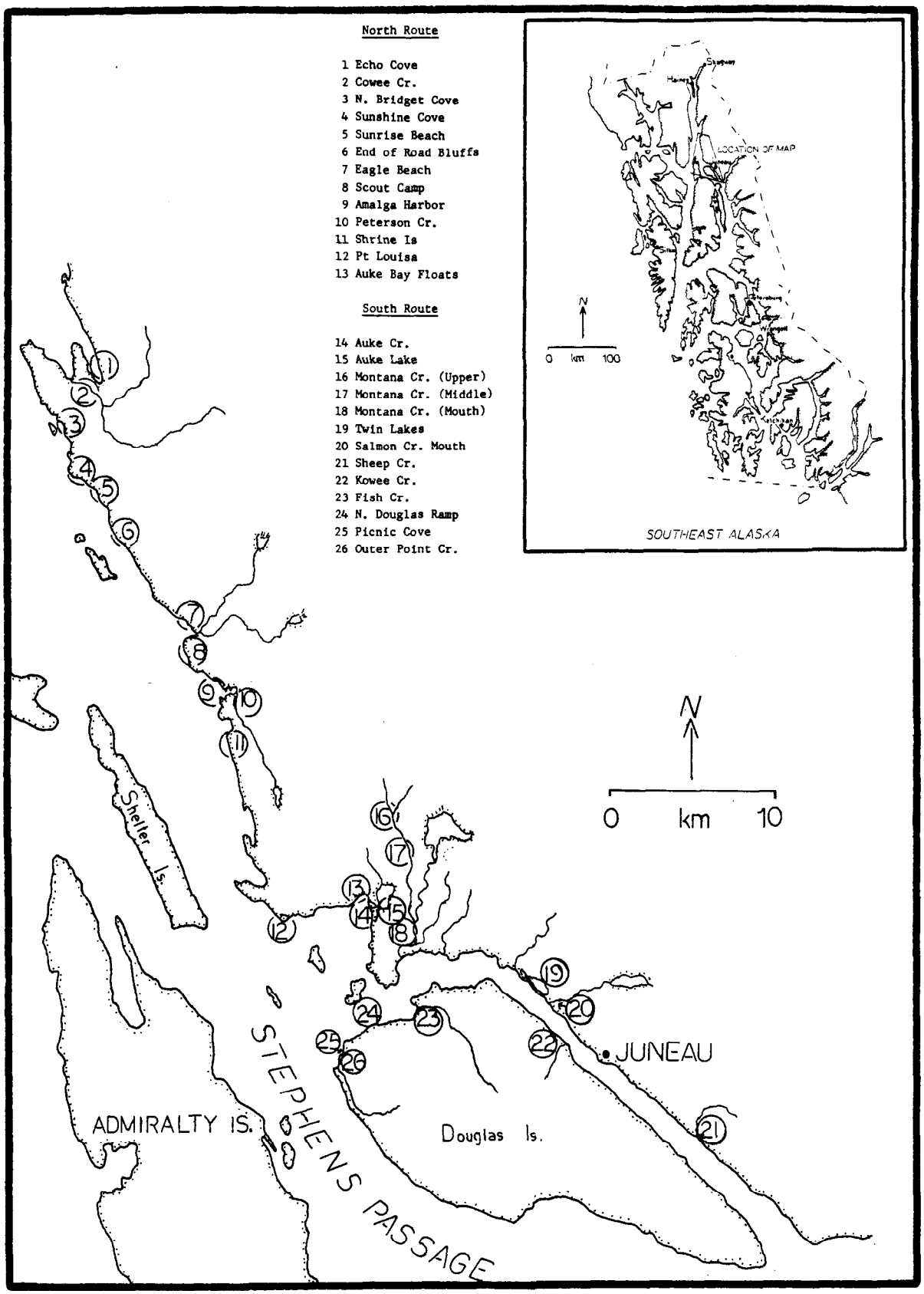

Figure 7. Sport fishing areas along the Juneau road system.

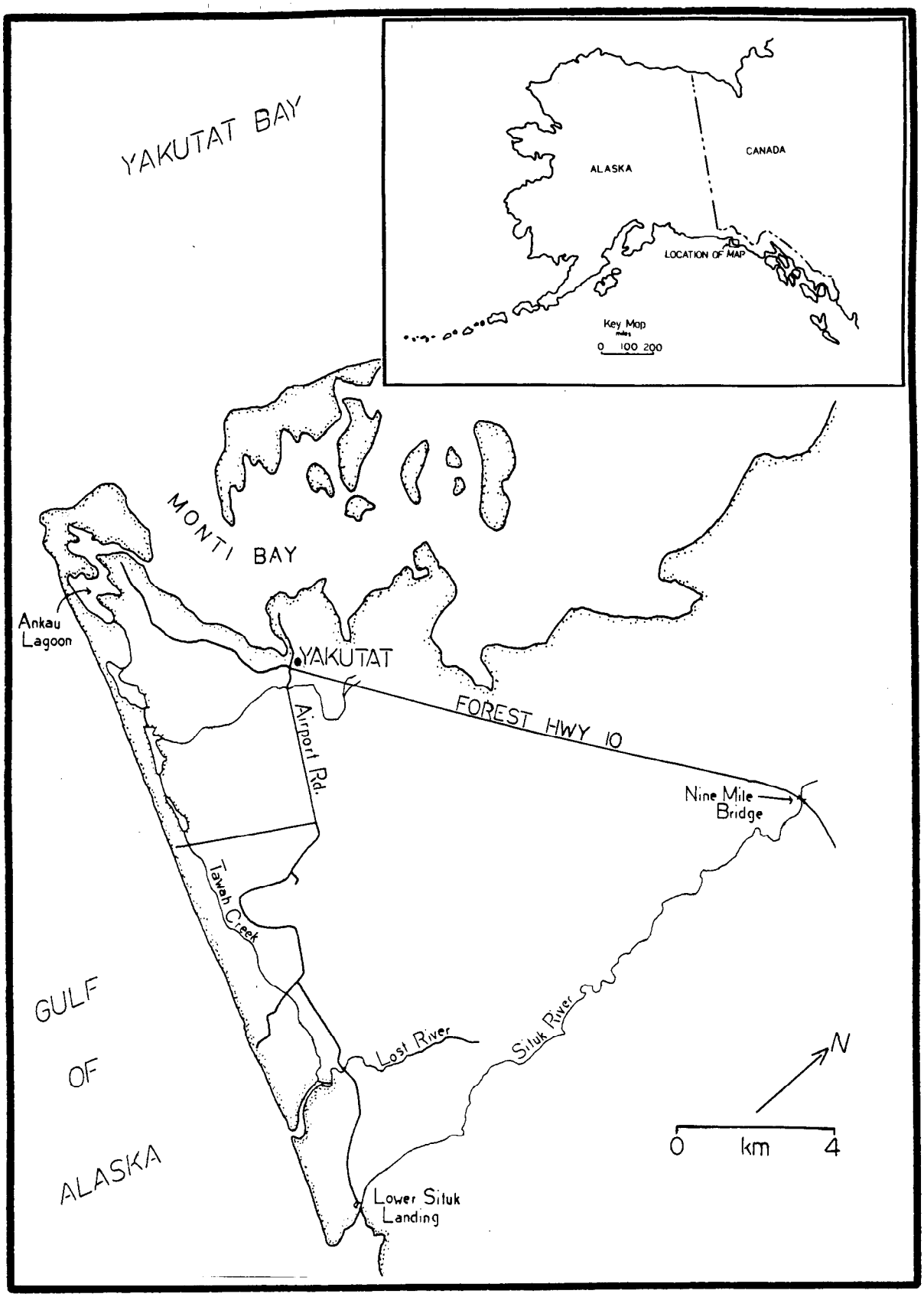

Figure 8. Sport fishing areas along the Yakutat road system.

3. To estimate the age and length composition of chinook salmon harvested in the Juneau, Ketchikan, Petersburg, Wrangell, Haines, and Sitka marine sport fisheries during the dates listed in objective 1.

4. To estimate the proportion of anglers using various gear type and method combinations during different time periods in the Juneau, Ketchikan, Petersburg, Wrangell, Haines, and Sitka marine sport fisheries and to estimate the catch-per-unit-effort (CPUE) for chinook salmon by each gear type and method combination (same dates as for Objective 1).

5. To estimate the angler-effort, CPUE, and harvest of important sport fish species at major access areas along the Juneau-Douglas road system from 1 July through 30 September 1986.

6. To estimate the angler-effort, CPUE, and harvest of hatchery-reared pink salmon and chum salmon at the Salmon Creek and Sheep Creek Special Harvest Areas (SHA) near Juneau from 1 July through 30 August 1986.

7. To estimate the length composition of Dolly Varden taken from Montana Creek.

8. To survey angler opinions of an "unbaited, artificial lures" special regulation at Montana Creek.

9. To estimate the angler effort and the recreational harvest of chinook salmon and steelhead in the Situk River near Yakutat from 1 April through 15 July 1986.

10. To estimate the angler effort and harvest of coho salmon in the Situk and Lost Rivers and Ankau Lagoon, near Yakutat from 15 August through 15 October 1986.

11. To estimate angler effort, CPUE, and harvest of salmon, trout, and char in the Chilkat and Chilkoot Rivers, near Haines from 16 July through 30 October 1986.

12. To estimate the angler effort, CPUE, and harvest of steelhead in Blind Slough, Ohmer Creek, and Falls Creek, near Petersburg from 1 April through 1 June 1986.

METHODS

Thirteen separate creel surveys of freshwater roadside, saltwater shoreline, and marine boat sport fisheries were conducted in southeast Alaska in 1986. Effort estimates were obtained through aerial boat counts (marine) or roving counts (roadside). Interviews of anglers provided information on time spent fishing and catch and species composition. Heads and recovery data from hatchery reared chinook and coho salmon and steelhead trout were also collected by creel samples.

Scientific terms, names, and abbreviations used in this report are listed in Tables 1 and 2.

Angler Effort and Harvest

Juneau and Ketchikan Marine Sport Fisheries:

The Juneau and Ketchikan marine sport fisheries are the two largest sport fisheries in southeast Alaska. Because effort and harvest are considerably higher in these fisheries than in the other Southeast marine sport fisheries, different methods were used to estimate fishery totals and characteristics. A modified, stratified, Petersen mark-recapture approach was utilized to obtain data for estimation of angler effort. Total boat effort ("boat-days") was estimated from aerial surveys of the Juneau and Ketchikan fishing grounds. Attributes of boats (e.g., catch composition, CPUE, hours spent fishing, and anglers per boat) were estimated from dockside interviews of anglers completing their fishing trips at various access points into the respective fisheries. For a more detailed description of the Petersen mark-recapture method, refer to Geiger and Mecum (1987).

For the Juneau marine fishery, the following seasonal period strata were defined:

Early - 16 April to 15 June
Middle - 16 June to 31 July
Derby - 1 August to 3 August
Late - 4 August to 15 October

Seasonal period strata for the Ketchikan marine fishery were defined as follows:

Early - 16 April to 29 June (excluding Derby dates)
Derby - 23 to 25 May, 1 and 2 June, and 6 and 7 June
Late - 30 June to 28 September

Days of the week were stratified into weekdays and weekend-holiday days for both fisheries. The length of the fishing day was assumed to never exceed the period from 0700 to 2300 hours. In past years, because of manpower and budget constraints, only the two highest used docks (Auke Bay and Tee Harbor) in Juneau were sampled by creel technicians. In 1986, access locations for conducting creel survey interviews (both for recaptures and for estimation of CPUE) were selected by a two-step process. The first step was to randomly select, for each day selected for aerial survey boat counts, one of the two traditional access locations to census during the period from 0700 to 2300 hours. These selections were conducted without replacement and then cycled. The second step was to randomly select one of seven other access locations (i.e., Amalga Harbor, Fisherman's Bend, Harris Harbor, Aurora Harbor, Douglas Harbor, North Douglas Launch Ramp, and DeHart's Marina). This second site was also selected at random without replacement and then cycled. During holiday weekends, the other traditionally sampled access site not selected in the above mentioned process, was also censused. All possible access locations in the Ketchikan marine fishery were not

Table 1. List of common names, scientific names, and abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Chinook salmon	*Oncorhynchus tshawytscha* Walbaum	KS
Chum salmon	*Oncorhynchus keta* Walbaum	CS
Coho salmon	*Oncorhynchus kisutch* Walbaum	SS
Pink salmon	*Oncorhynchus gorbuscha* Walbaum	PS
Sockeye salmon	*Oncorhynchus nerka* Walbaum	RS
Cutthroat trout	*Salmo clarki* Richardson	CT
Dolly Varden	*Salvelinus malma* Walbaum	DV
Pacific Halibut	*Hippoglossus stenolepis* Schmidt	H
Steelhead trout	*Salmo gairdneri* Richardson	SH
Rockfish	*Sebastes* sp.	RF

Table 2. List of agency names or scientific terms, and abbreviations.

Name or Term	Abbreviation
Catch-per-unit-effort	CPUE
Special Harvest Area	SHA
Alaska Department of Fish and Game	ADF&G
National Marine Fisheries Service	NMFS
Southern Southeast Regional Aquaculture Association	SSRAA
Northern Southeast Regional Aquaculture Association	NSRAA
Canadian Department of Fisheries and Oceans	CDFO
Canadian Department of Fisheries Research	CDFR
Washington Department of Fisheries	WDF
Oregon Department of Fish and Wildlife	ODFW
Metlakatla Indian Community	MIC
Anadromous Incorporated	ANAD

sampled due to budgetary constraints. Only the Bar Harbor, Knudsen Cove, and Clover Pass docks were sampled by creel technicians. Detailed descriptions of estimation procedures and formulas are provided in Appendix A.

Petersburg, Wrangell, Haines, and Sitka Marine Sport Fisheries:

Estimates of angler effort for the Petersburg, Wrangell, Haines, and Sitka marine sport fisheries were obtained from instantaneous counts drawn from a stratified, random, sample of available hours within each stratum (type of fishing day). Each day in the fishery was divided into morning (0730 hours to midday) and evening (midday to civil twilight) sampling periods. Because approximately 70 percent of angling effort was expected to occur during the evening sampling periods, nonuniform, probability sampling was used to select sampling periods for angler interviews (Malvestuto and Davies 1978). Twenty-five aerial surveys of the fishing grounds were conducted for each fishery to estimate boat-hours of fishing effort (number of boats observed actually fishing during one-hour flights). Flights were allocated evenly between weekday and weekend-holiday strata and were selected randomly from all possible hours within a particular stratum. In Petersburg, Sitka, and Haines, five aerial surveys were conducted during the respective Derby strata. Boat-hours of effort were estimated by averaging the aerial boat counts over the entire season in each respective stratum. Then, the average boat-hours per stratum was multiplied times the total available hours in each fishery to obtain total boat effort within a stratum. Please refer to Appendices B (Petersburg and Haines) and C (Sitka and Wrangell) for a detailed description of estimation procedures and formulas.

Yes Bay Creel Survey:

The total harvest of chinook salmon, coho salmon, and halibut by anglers fishing at the Yes Bay Resort near Ketchikan from 15 May to 15 September, 1986 was obtained through a voluntary catch reporting system. Angler catch rates, total fishing effort, and contributions of coded micro-wire tagged chinook and coho salmon were not obtained.

Blind Slough and Thomas Basin Special Harvest Areas:

Creel technicians interviewed individual anglers completing their fishing trips at the Thomas Basin (Ketchikan) and Blind Slough (Petersburg) Special Harvest Areas (SHA) to determine angler effort (hours fished), and number of hatchery-produced chinook salmon caught, kept, and released. Weeks in the fishery (3 June to 4 August 1986) were stratified into weekdays and weekend-holidays. The sampling design was two-stage, where weeks were the primary sampling units (all weeks were sampled) and sampling periods within a week were the second stage sampling units. All days in the fishery were divided into four sampling periods, each 3 hours and 45 minutes long. Period 1 started at 0730 hours and ended at 1115 hours, period 2 began at 1116 hours, and ended at 1500 hours, period 3 ran from 1501 hours to 1845 hours, and period 4 began at 1846 hours and ended at 2230 hours For each stratum, all sampling periods within a week were numbered consecutively. Then a simple random sample of these periods (five for each stratum) was randomly selected.

The average number of anglers per sampling period was calculated by:

$$\hat{\bar{X}} = [(N_h M_h / \Sigma N_h M_h) \bar{x}_h]$$

where:

$\hat{\bar{X}}$ = mean anglers per sampling period for all strata

$\bar{x}_h$ = mean anglers per sampling period for stratum h

N_h = number of first stage units (weeks) in stratum h

M_h = number of second stage units (sampling periods) per first stage unit in stratum h

Catch-per-unit-effort (CPUE) was calculated as the number of chinook salmon harvested per hour fished. Within a sampling period, CPUE was calculated from:

$$R_t = C_t / h_t$$

where:

R_t = CPUE during sampling period t (stratum-week combination)

C_t = total harvest of a particular fish species by all anglers interviewed in sampling period t

h_t = total hours fished by all anglers interviewed in sampling period t

The total harvest of chinook salmon for each weekly period and stratum was estimated by multiplying the weekly CPUE times the estimated angler hours. Individual stratum estimates within each week were summed for weekly totals and weekly totals were summed to produce seasonal estimates.

Haines Roadside Sport Fisheries:

During the period from 14 July to 31 October, anglers were interviewed at access areas along the Chilkoot River, Chilkat River, and Lutak Inlet (saltwater shoreline) according to a stratified, random, sampling schedule. Survey weeks were stratified by day type (i.e., weekdays or weekend- holidays) and days were divided into four sampling periods of equal length varying from 3 to 4 hours depending on the amount of daylight. From 14 July to 31 August, sampling periods were selected on a weekly basis allowing weekly estimates of effort, harvest, and CPUE by species. However, during the period from 1 September to 31 October, sampling periods were randomly selected from the total possible periods available for either the weekday or weekend-holiday strata.

Instantaneous counts and CPUE data obtained from interviews with individual anglers were used to obtain estimates of effort, harvest, and CPUE. Individual anglers were asked the number and species of fish caught, kept, and released, the amount of time spent fishing, and the species and number of marked fish caught and kept. The direction of travel by the creel technician and the time (start or end of the sampling period) for making instantaneous counts were randomly selected. At a given site, any time not spent making instantaneous counts was used to conduct angler interviews. If all anglers fishing at a particular site could not be interviewed, anglers were skipped in a systematic fashion. (i.e., every third or fourth angler).

The average number of anglers per count at a particular access site was calculated as:

$$\bar{x} = (\Sigma x_i)/n$$

where: n = the number of instantaneous counts made at a given site in a particular stratum

x_i = number of individual anglers actually fishing at a particular access area (in a particular stratum) during an instantaneous count

Total angler hours (H) for a stratum, period, and access area combination was estimated by:

$$H = N\bar{x} = N\,(\Sigma x_i)/n$$

where: N = total number of possible fishing hours in a stratum for a particular time period

The average CPUE ($\hat{\bar{r}}$) for a given fish species, stratum, time period, and access area combination was estimated as follows:

$$\hat{\bar{r}} = \Sigma y_{jkh}/\Sigma h_{kh}$$

where: y_{jkh} = number of fish of species j caught by all anglers contacted during period k in stratum h

h_{kh} = hours fished by all anglers contacted during period k in stratum h

Total harvest of a given species for each stratum, access area, and time period combination was estimated by multiplying CPUE times the estimated angler hours. Individual stratum estimates within each week were summed for weekly estimates and weekly estimates were summed to produce seasonal estimates.

Petersburg Roadside Sport Fisheries:

Steelhead anglers fishing at Falls, Ohmer, and Crystal (Blind Slough) Creeks near Petersburg were surveyed from 15 April to 1 June 1986 in order to estimate the total angling effort and harvest of wild and

hatchery produced steelhead. Each day in the six-week season was divided into four sampling periods of equal length. Days were stratified into weekday and weekend-holiday strata. For a given week, the fishing day was assumed to begin at 0700 hours and end at the average civil twilight hour for that week.

Within each week, a simple random sample of all possible sampling periods (20 for weekdays and 8 for weekend days) was drawn using a random numbers table. The starting point of the survey and whether instantaneous counts were made upon arrival or before departure from a given location, were also randomly selected. Time not spent making instantaneous counts was used for conducting interviews with individual anglers; all anglers fishing at each site were interviewed. During angler interviews, the sampler recorded the time spent fishing to the nearest ten minutes, the number of fish caught, kept, and released, and the number of adipose-clipped steelhead caught and kept. The formulas for estimating angler effort, CPUE, and harvest were similar to those used for the Haines roadside fishery.

Yakutat Roadside Sport Fisheries:

The spring steelhead trout fishery on the Situk River was sampled from 1 April to 15 June. Days were not stratified by weekday and weekend-holidays because of the large number of non-resident anglers in the fishery (most trips are from four to five days in length). Each day (0730 hours to civil twilight) was divided into four sampling periods of equal length and a total of six sampling periods out of the possible 28 periods within each week were randomly sampled. A similarly designed, stratified, random creel survey was conducted from 15 June to 15 July on the Situk River chinook and sockeye salmon fishery.

Angler effort and the harvest of coho salmon at the Situk and Lost Rivers, Tawah Creek, and Ankau Lagoon sport fisheries were estimated starting 15 August and running to 15 October. Completed fishing trips by coho salmon anglers fishing the Situk and Lost Rivers and Tawah Creek, were sampled at a roadside check station. Estimates of angler effort and harvest in these fisheries were obtained by multiplying the sampled characteristics by the total number of sampling periods in the designated season.

At the Ankau Lagoon system, data collected from instantaneous counts and incompleted trip interviews with coho salmon anglers were used to estimate total angler effort and harvest of coho salmon. Each day (0730 to civil twilight) was stratified into two time periods of equal length. Samples were allocated randomly for each of the two monthly periods.

Estimation formulas for the Ankau Lagoon fishery were the same as those used for the Petersburg and Haines roadside sport fisheries.

Juneau Roadside Sport Fisheries:

A creel survey based on a stratified, random sampling design was conducted on the Juneau-Douglas road system from 1 July through 30 September 1986. Angler-effort and catch statistics were estimated

separately for weekdays and weekend-holidays. Each day in each stratum was divided into two sampling periods of equal length. Estimates of effort, harvest, and CPUE were obtained for two-week periods during the season. A total of 26 major access points were surveyed. These sites were selected by examining previous survey data to determine areas of heaviest angler use. The entire fishery was divided into northern (Echo Cove to Auke Bay Floats) and southern (Auke Lake to Peterson Creek on Douglas Island) sampling routes.

Angler-effort was estimated from instantaneous counts of anglers and angler CPUE was estimated from interviews with individual anglers fishing at each site. At Montana Creek, additional information collected during angler interviews included measuring Dolly Varden for size composition estimates and asking anglers their opinion of existing special regulations (unbaited artificial lures only).

Estimation formulae for the Juneau roadside fishery were the same as those used for the Petersburg and Haines roadside fisheries listed previously.

Chinook Age Composition and Origin

In all marine sport fisheries, tip of snout to fork of tail lengths of chinook salmon, were obtained for estimating size composition of the sport harvest. In addition, several scales were removed from the third row above the lateral line in an area on a diagonal from the insertion of the dorsal fin to the origin of the anal fin. Then, age composition of the sport chinook harvest was estimated from analysis of scale data.

Hatchery Contributions to Southeast Marine Sport Fisheries

Adipose-clipped chinook and coho salmon were measured (tip of snout to fork of tail) and their heads retained. A locking plastic strap with a unique number was inserted through the jaw. Heads and coded micro-wire tag recovery data were sent to the ADF&G Coded-Wire-Tag Processing Laboratory in Juneau for tag removal and decoding.

Heads were classified as random (randomly sampled during regularly scheduled creel sampling periods) or select (voluntarily turned in to creel technicians or other ADF&G personnel and would not have been randomly sampled by creel technicians). However, the contribution of a particular tag code to a marine sport fishery for the season was estimated only from random recoveries, as follows:

$$C = m_2 \, (N/n) \, (M/m)$$

where: m_2 = number of tags randomly recovered during the creel survey from a given tag code.

N = estimated harvest of a species for a season

n = number of fish of a given species examined for missing adipose fins

M = estimated number of fish of a species in a

given hatchery release (tagged and untagged)

m = number of fish of a species and tag code released from a given hatchery

The above formula was not used for expanding recoveries of undersized (less than 28 inches in total length) chinook salmon. Only tagged, undersized chinook may be legally retained while untagged undersized fish from same release may not be kept. Therefore, undersized chinook recoveries were only expanded by the fraction of chinook sampled for adipose-clips and not by any tagged to untagged ratios.

Seasonal Use and Relative Efficiency of Sport Gear

At the December 1985 meeting, the Alaska Board of Fisheries, banned the use of downriggers in Southeast marine sport fisheries from 15 April to 15 June for conservation of Alaska stocks of chinook. This period is the existing spring conservation closure in Stephens Passage near Juneau. After considerable negative public comment the Board rescinded this regulation. However, the Board directed the Division of Sport Fish to initiate a study of the use and relative efficiency of downriggers in catching chinook salmon, compared to other types of commonly used sport fishing gear.

To satisfy this request, fishing parties completing saltwater fishing trips in all major Southeast marine sport fisheries where creel surveys were already scheduled were asked the following questions:

1. How many rod-hours were spent:

    a) trolling with conventional sport gear.
    b) trolling with diving devices
    c) trolling with downriggers
    d) drift fishing using any of the above mentioned gear types
    e) anchored
    f) fishing by other means (e.g., fly fishing)

2. How many chinook salmon were caught, kept, and released by any of the above mentioned gear-method (i.e., trolling drifting, or anchored) combinations.

For the purposes of this study, downriggers were defined as any mechanical device or hand line with a heavy weighted line for attachment of the fishing line of a rod and reel. Diving devices are small, plastic inclined planes designed to dive downward in the water column. Drift fishing was considered as drifting along with the wind or tide while anchored was defined as fishing from an anchored boat.

Chinook salmon catch rates for each type of gear, method, and gear-method combination were calculated by dividing the sampled catch of chinook by the total rod-hours expended in each category. Catch rates were calculated separately for non-chartered and chartered anglers, for

anglers targeting on salmon and on bottomfishes, and for several seasonal time periods in the Juneau and Ketchikan marine fisheries.

RESULTS

Angler Effort and Harvest

Over 30,000 angler contacts were made by creel samplers in the Juneau, Ketchikan, Petersburg, Wrangell, Haines, and Sitka marine sport fisheries, saltwater shoreline fisheries at Thomas Basin and Blind Slough, and freshwater roadside fisheries in Juneau, Yakutat, Haines and Petersburg during 1986. Estimated effort and harvest, by species are listed in Tables 3 through 20, and estimates of catch rates (fish per rod-hour) in Tables 21 through 31. The weekly catch rates as listed, were calculated from the sampled data, and as such, do not represent unbiased estimates of the catch rates in the associated fisheries. For example, the catch rate estimates should take into account the sampling effort within each stratum for a particular survey. However, because the magnitude of bias was believed to be small and because of time constraints, no further analysis of the catch rate data was attempted.

Marine Sport Fisheries:

Total harvest estimates for the surveyed marine fisheries were similar to those observed for the same marine fisheries in 1985. However, catches of chinook and coho salmon by Juneau marine anglers were well below the average harvests seen in recent years. Roughly 20 percent of the seasonal harvest of chinook and 10 percent of the seasonal angler effort for the Juneau marine fishery occurred during the 3-day Golden North Salmon Derby (Table 32). Seasonal average catch rates for chinook and coho salmon for the Juneau fishery were also below those observed in recent years (Tables 33 and 34). Coho fishing was particularly poor during the early part of the coho season (Figure 9) and during the Golden North Salmon Derby when only 350 coho salmon were harvested. The lowest Derby coho harvest observed previous to 1986 occurred in 1975 when 670 coho were harvested.

Ketchikan anglers enjoyed excellent fishing for chinook and coho salmon in 1986. Catch rates for coho salmon in Ketchikan (Figure 10) were very good both during the early and late portions of the fishing season. Even though the total angler effort was 40 percent less in Ketchikan than in Juneau, approximately the same number of chinook salmon and over twice the number of coho salmon were caught in the Ketchikan fishery.

Juneau Roadside Sport Fisheries:

Important fishing access areas along the Juneau roadside were only surveyed from 1 July through 28 September. Because of this, no meaningful comparisons can be made to surveys conducted in past years that were conducted over the entire fishing season. There were some interesting patterns observed, however, that deserve mention, most notably the lack of angler effort and fish harvest observed at Twin

Table 3. Estimated effort and harvest of selected southeast Alaska marine sport fisheries during 1986.

CITY	TIME PERIOD	SALMON HOURS	BOTTOM FISH HOURS	CHIN-OOK <28IN KEPT	CHIN-OOK >28IN KEPT	CHIN-OOK <28IN RELE	CHIN-OOK >28IN RELE	HALI-BUT KEPT	HALI-BUT RELE	COHO	PINK	CHUM	SOCK-EYE	DOLLY VARD-EN	ROCK-FISH KEPT	ROCK-FISH RELE
JUNEAU	04/14-10/05	240921	77165	281	4769	7154	169	13132	6868	9763	1250	513	6	196	484	420
KETCHIKAN	04/28-09/28	133518	51208	525	4481	18285	484	8208	1577	20814	9877	559	11	0	6017	7527
WRANGELL	04/14-07/06	43125	3984	0	1812	440	58	641	11	12	204	35	0	72	45	0
PETERSBURG	04/14-06/29	20810	3949	17	1053	148	4	581	494	0	0	0	0	445	193	0
HAINES	04/14-07/13	32533	1324	17	1638	334	21	219	26	0	9	0	0	192	4	0
SITKA	04/14-06/29	31661	9210	0	769	731	48	2228	625	25	4	8	0	147	1850	5657
TOTAL		502568	146840	840	14522	27092	780	25009	9601	30614	11344	1115	17	1052	8593	13604

Table 4. Estimated effort, harvest, variances, and coefficients of variation by species and seasonal period stratum in the Juneau marine sport fishery from 20 April to 21 September 1986.

	STRATUM						
	WEEKEND-4/20-6/15	WEEKDAY-4/14-6/15	WEEKEND-6/16-7/31	WEEKDAY-6/16-7/31	WEEKEND-8/04-9/21	WEEKDAY-8/04-9/21	SUM OF STRATA
BOAT DAYS OF EFFORT	3451.4	2442.4	3941.0	4324.0	4762.7	4659.5	23580.9
VARIANCE	12967.5	19714.0	2743.6	5446.7	3019.5	34175.2	78066.5
C.V.	3.3	5.7	1.3	1.7	1.2	4.0	1.2
CHIN >28 IN. KEPT	429	416	739	1150	379	610	3724
VARIANCE	215.1	749.8	147.2	2463.9	36.8	1373.0	4985.8
C.V.	3.4	6.6	1.6	4.3	1.6	6.1	1.9
CHIN >28 IN. RELEASED	5	14	40	25	23	14	121
VARIANCE	0.2	2.7	3.5	12.1	1.0	13.2	32.6
C.V.	8.8	11.6	4.6	13.9	4.4	25.3	4.7
CHIN <28 IN. KEPT	0	7	67	56	26	50	207
VARIANCE	0.0	0.6	3.9	28.4	0.8	24.7	58.4
C.V.	.	10.5	3.0	9.5	3.5	9.9	3.7
CHIN <28 IN. RELEASED	104	120	1037	1431	694	862	4248
VARIANCE	17.1	95.9	357.3	1814.8	130.9	2194.9	4610.9
C.V.	4.0	8.2	1.8	3.0	1.6	5.4	1.6
HALIBUT KEPT	745	424	3312	3243	2094	2075	11893
VARIANCE	647.6	704.9	2327.8	9272.5	801.9	10869.3	24624.0
C.V.	3.4	6.3	1.5	3.0	1.4	5.0	1.3
HALIBUT RELEASED	486	353	2027	1650	998	689	6203
VARIANCE	285.6	973.2	1075.9	4524.7	278.7	2247.5	9385.6
C.V.	3.5	8.8	1.6	4.1	1.7	6.9	1.6
COHO KEPT	0	14	174	431	4038	4738	9396
VARIANCE	0.0	2.1	16.3	308.5	2554.0	56439.7	59320.5
C.V	.	10.3	2.3	4.1	1.3	5.0	2.6
PINK KEPT	0	0	274	444	154	165	1037
VARIANCE	0.0	0.0	33.6	410.9	12.1	128.9	585.5
C.V.	.	.	2.1	4.6	2.3	6.9	2.3
CHUM KEPT	0	0	47	112	210	122	492
VARIANCE	0.0	0.0	2.4	94.6	16.3	110.1	223.4
C.V.	.	.	3.3	8.6	1.9	8.6	3.0
SOCKEYE KEPT	0	0	3	0	0	0	3
VARIANCE	0.0	0.0	0.1	0.0	0.0	0.0	0.1
C.V.	.	.	11.4	.	.	.	11.4
DOLLY VARDEN KEPT	52	21	40	62	4	0	179
VARIANCE	4.5	5.5	3.8	187.3	0.1	0.0	201.2
C.V.	4.1	11.0	4.8	21.9	8.9	.	7.9

Table 5. Estimated effort, harvest (take home catch only; not entered in derby competition), variances, and coefficients of variation by species in the Juneau Golden North Salmon Derby, 1 August to 3 August 1986.

BOAT DAYS OF EFFORT		3010.5
	VARIANCE	400.2
	C.V.	0.7
CHIN >28 IN. TAKEN HOME		274
	VARIANCE	1105.0
	C.V.	12.1
CHIN >28 IN. RELEASED		41
	VARIANCE	268.5
	C.V.	40.4
CHIN <28 IN. TAKEN HOME		47
	VARIANCE	182.8
	C.V.	28.5
CHIN <28 IN. RELEASED		2899
	VARIANCE	42021.6
	C.V.	7.1
HALIBUT KEPT		1160
	VARIANCE	12464.9
	C.V.	9.6
HALIBUT RELEASED		646
	VARIANCE	8272.3
	C.V.	14.1
COHO TAKEN HOME		122
	VARIANCE	385.6
	C.V	16.1
PINK TAKEN HOME		213
	VARIANCE	1127.5
	C.V.	15.8
CHUM TAKEN HOME		14
	VARIANCE	45.0
	C.V.	49.6
SOCKEYE KEPT		0
	VARIANCE	0.0
	C.V.	0.0
DOLLY VARDEN KEPT		17
	VARIANCE	107.4
	C.V.	61.3

Table 6. Estimated effort, harvest, variances, and coefficients of variation by species and seasonal period stratum in the Ketchikan marine sport fishery (includes the Ketchikan King Salmon Derby) from 28 April to 28 September 1986.

	STRATUM				
	WEEKEND-EARLY	WEEKDAY-EARLY	WEEKEND-LATE	WEEKDAY-LATE	SUM OF STRATA
BOAT DAYS OF EFFORT	3896.1	4118.1	3300.6	4636.4	15951.3
VARIANCE	1709.7	11275.6	1323.9	11789.3	26098.4
C.V.	1.1	2.6	1.1	2.3	1.0
CHIN >28 IN. KEPT	1960	1462	424	634	4481
VARIANCE	455.9	2459.9	35.7	452.9	3404.4
C.V.	1.1	3.4	1.4	3.4	1.3
CHIN >28 IN. RELEASED	123	296	24	40	484
VARIANCE	4.4	1425.1	1.5	30.1	1461.0
C.V.	1.7	12.7	5.1	13.5	7.9
CHIN <28 IN. KEPT	167	157	59	142	525
VARIANCE	8.3	286.0	1.8	39.9	335.9
C.V.	1.7	10.7	2.3	4.5	3.5
CHIN <28 IN. RELEASED	5464	4118	3513	5190	18285
VARIANCE	3664.3	16202.4	1888.8	24937.9	46693.4
C.V.	1.1	3.1	1.2	3.0	1.2
HALIBUT KEPT	1261	1694	2310	2942	8208
VARIANCE	227.5	4243.7	780.2	8222.8	13474.2
C.V.	1.2	3.8	1.2	3.1	1.4
HALIBUT RELEASED	392	278	428	479	1577
VARIANCE	41.9	227.9	39.4	754.2	1063.5
C.V.	1.7	5.4	1.5	5.7	2.1
COHO KEPT	1009	2480	6723	10602	20814
VARIANCE	183.5	13166.3	5928.1	88956.2	108234.0
C.V	1.3	4.6	1.1	2.8	1.6
PINK KEPT	705	990	3195	4987	9877
VARIANCE	115.1	2469.6	1482.8	23622.4	27689.9
C.V.	1.5	5.0	1.2	3.1	1.7
CHUM KEPT	74	56	126	304	559
VARIANCE	1.7	29.3	3.7	115.3	150.1
C.V.	1.8	9.8	1.5	3.5	2.2
SOCKEYE KEPT	3	0	8	0	11
VARIANCE	0.0	0.0	0.3	0.0	0.3
C.V.	7.4	0.0	7.0	0.0	5.0
DOLLY VARDEN KEPT	0	0	0	0	0
VARIANCE	0.0	0.0	0.0	0.0	0.0
C.V.	0.0	0.0	0.0	0.0	0.0
ROCKFISH KEPT	880	1185	1941	2011	6017
VARIANCE	150.1	4351.9	635.4	6275.9	11413.2
C.V.	1.4	5.6	1.3	3.9	1.8
ROCKFISH RELEASED	954	1582	2102	2888	7527
VARIANCE	162.3	8218.3	824.5	16774.0	25979.0
C.V.	1.3	5.7	1.4	4.5	2.1

Table 7. Estimated effort, harvest, variances, and coefficients of variation by species and stratum in the Petersburg marine sport fishery (excluding the Petersburg King Salmon Derby) from 14 April to 29 June 1986.

	STRATUM		
	WEEKEND-HOLIDAY	WEEKDAYS	SUM OF STRATA
BOAT HOURS OF EFFORT	2925.0	5332.8	8257.8
VARIANCE	761151.9	4928554.2	5689706.1
C.V.	29.8	41.6	28.9
CHIN >28 IN. KEPT	273	474	748
VARIANCE	7473.4	44073.6	51547.0
C.V.	31.6	44.3	30.4
CHIN >28 IN. RELEASED	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
CHIN <28 IN. KEPT	7	10	17
VARIANCE	46.7	39.2	85.9
C.V.	95.5	61.3	54.5
CHIN <28 IN. RELEASED	41	94	135
VARIANCE	230.9	2766.3	2997.2
C.V.	36.8	55.9	40.6
HALIBUT KEPT	254	300	555
VARIANCE	7006.7	20241.0	27247.7
C.V.	32.9	47.4	29.7
HALIBUT RELEASED	276	184	459
VARIANCE	9851.6	8380.3	18232.0
C.V.	36.0	49.8	29.4
COHO KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V	0.0	0.0	0.0
PINK KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
CHUM KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
SOCKEYE KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
DOLLY VARDEN KEPT	184	247	432
VARIANCE	19877.2	93385.4	113262.6
C.V.	76.5	123.6	77.9
ROCKFISH KEPT	148	41	189
VARIANCE	6025.8	623.2	6649.1
C.V.	52.5	61.1	43.1
ROCKFISH RELEASED	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0

Table 8. Estimated effort, harvest, variances, and coefficients of variation by species in the Petersburg King Salmon Derby, 23 May to 26 May 1986.

BOAT HOURS OF EFFORT	3015.4
VARIANCE	33542.0
C.V.	6.1
CHIN >28 IN. KEPT	305
VARIANCE	715.7
C.V.	8.8
CHIN >28 IN. RELEASED	4
VARIANCE	3.6
C.V.	43.4
CHIN <28 IN. KEPT	0
VARIANCE	0.0
C.V.	0.0
CHIN <28 IN. RELEASED	13
VARIANCE	18.9
C.V.	33.2
HALIBUT KEPT	26
VARIANCE	51.8
C.V.	27.5
HALIBUT RELEASED	35
VARIANCE	110.7
C.V.	30.1
COHO KEPT	0
VARIANCE	0.0
C.V	0.0
PINK KEPT	0
VARIANCE	0.0
C.V.	0.0
CHUM KEPT	0
VARIANCE	0.0
C.V.	0.0
SOCKEYE KEPT	0
VARIANCE	0.0
C.V.	0.0
DOLLY VARDEN KEPT	13
VARIANCE	33.6
C.V.	44.2
ROCKFISH KEPT	4
VARIANCE	11.6
C.V.	78.1
ROCKFISH RELEASED	0
VARIANCE	0.0
C.V.	0.0

Table 9. Estimated effort, harvest, variances, and coefficients of variation by species and stratum in the Wrangell marine sport fishery (includes the Wrangell King Salmon Derby) from 14 April to 7 July 1986.

	STRATUM		
	WEEKEND-HOLIDAY	WEEKDAYS	SUM OF STRATA
BOAT HOURS OF EFFORT	11884.4	7285.4	19169.8
VARIANCE	21323811.7	4364897.2	25688708.9
C.V.	38.9	28.7	26.4
CHIN >28 IN. KEPT	1013	799	1812
VARIANCE	161567.9	54606.4	216174.3
C.V.	39.7	29.3	25.7
CHIN >28 IN. RELEASED	52	6	58
VARIANCE	806.9	13.2	820.1
C.V.	54.3	62.2	49.4
CHIN <28 IN. KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
CHIN <28 IN. RELEASED	246	194	440
VARIANCE	106958.4	6620.4	113578.8
C.V.	133.1	41.9	76.7
HALIBUT KEPT	272	369	641
VARIANCE	16498.6	16813.4	33312.0
C.V.	47.2	35.1	28.5
HALIBUT RELEASED	5	6	11
VARIANCE	8.4	5.5	13.9
C.V.	55.5	40.1	33.8
COHO KEPT	0	12	12
VARIANCE	0.0	65.6	65.6
C.V	0.0	69.4	69.4
PINK KEPT	140	64	204
VARIANCE	3940.4	7518.7	11459.1
C.V.	44.8	135.1	52.5
CHUM KEPT	35	0	35
VARIANCE	335.5	0.0	335.5
C.V.	53.0	0.0	53.0
SOCKEYE KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
DOLLY VARDEN KEPT	66	6	72
VARIANCE	18889.9	13.2	18903.0
C.V.	208.5	62.2	50.8
ROCKFISH KEPT	10	35	45
VARIANCE	40.9	314.3	355.2
C.V.	61.2	50.6	41.9
ROCKFISH RELEASED	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0

Table 10. Estimated effort, harvest, variances, and coefficients of variation by species and stratum in the Haines marine sport fishery (excluding the Haines King Salmon Derby) from 14 April to 13 July 1986.

	STRATUM		
	WEEKEND-HOLIDAY	WEEKDAYS	SUM OF STRATA
BOAT HOURS OF EFFORT	4223.4	6751.0	10974.4
VARIANCE	1127436.8	3451887.0	4579323.9
C.V.	25.1	27.5	19.5
CHIN >28 IN. KEPT	478	814	1292
VARIANCE	17537.3	56966.4	74503.7
C.V.	27.7	29.3	21.1
CHIN >28 IN. RELEASED	0	9	9
VARIANCE	0.0	23.8	23.8
C.V.	0.0	55.8	55.8
CHIN <28 IN. KEPT	8	9	17
VARIANCE	31.9	37.5	69.4
C.V.	69.7	69.9	49.0
CHIN <28 IN. RELEASED	118	139	257
VARIANCE	2317.5	2058.9	4376.3
C.V.	40.8	32.7	25.7
HALIBUT KEPT	113	101	215
VARIANCE	3624.9	1025.5	4650.4
C.V.	53.1	31.6	31.7
HALIBUT RELEASED	17	9	26
VARIANCE	109.6	37.4	147.0
C.V.	60.3	69.9	46.6
COHO KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V	0.0	0.0	0.0
PINK KEPT	0	9	9
VARIANCE	0.0	64.2	64.2
C.V.	0.0	91.5	91.5
CHUM KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
SOCKEYE KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
DOLLY VARDEN KEPT	38	130	168
VARIANCE	753.0	1982.2	2735.2
C.V.	71.8	34.2	31.1
ROCKFISH KEPT	0	4	4
VARIANCE	0.0	2.2	2.2
C.V.	0.0	39.3	39.3
ROCKFISH RELEASED	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0

Table 11. Estimated harvest by species in the Haines King Salmon Derby from 24 May to 26 May and from 31 May to 1 June 1986.

		CHINOOK				
	Entered	Take Home	<28 in. Released	>28 in. Released	Dolly Varden	Halibut
5/24 - 5/26						
Derby	136	102	29	11	14	0
Non-Derby	-	14	2	1	1	0
5/31 - 6/1						
Derby	36	36	35	0	7	3
Non-Derby	-	22	11	0	2	1
Total	172	346	77	12	24	4

Derby Validations = 1,147
Non Derby Angler Days = 149

Table 12. Estimated effort, harvest, variances, and coefficients of variation by species and stratum in the Sitka marine sport fishery (excluding the Sitka King Salmon Derby) from 14 April to 29 June 1986.

	STRATUM		
	WEEKEND-HOLIDAY	WEEKDAYS	SUM OF STRATA
BOAT HOURS OF EFFORT	1974.0	7131.6	9105.6
VARIANCE	340817.1	5208988.6	5549805.7
C.V.	29.6	32.0	25.9
CHIN >28 IN. KEPT	133	308	442
VARIANCE	5269.4	13254.5	18523.9
C.V.	54.4	37.4	30.8
CHIN >28 IN. RELEASED	42	0	42
VARIANCE	3279.5	0.0	3279.5
C.V.	137.3	0.0	137.3
CHIN <28 IN. KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
CHIN <28 IN. RELEASED	77	535	612
VARIANCE	588.2	32388.5	32976.7
C.V.	31.5	33.6	29.7
HALIBUT KEPT	243	1770	2013
VARIANCE	5709.2	342066.0	347775.2
C.V.	31.1	33.0	29.3
HALIBUT RELEASED	62	491	552
VARIANCE	379.6	35077.4	35457.0
C.V.	31.6	38.2	34.1
COHO KEPT	4	21	25
VARIANCE	2.0	62.1	64.1
C.V	36.6	36.9	32.0
PINK KEPT	4	0	4
VARIANCE	2.0	0.0	2.0
C.V.	36.6	0.0	36.6
CHUM KEPT	8	0	8
VARIANCE	20.8	0.0	20.8
C.V.	59.2	0.0	59.2
SOCKEYE KEPT	0	0	0
VARIANCE	0.0	0.0	0.0
C.V.	0.0	0.0	0.0
DOLLY VARDEN KEPT	0	85	85
VARIANCE	0.0	3035.2	3035.2
C.V.	0.0	64.5	64.5
ROCKFISH KEPT	62	1546	1607
VARIANCE	423.0	355215.7	355638.6
C.V.	33.4	38.6	37.1
ROCKFISH RELEASED	820	2296	3117
VARIANCE	71234.3	621244.0	692478.3
C.V.	32.5	34.3	26.7

Table 13. Estimated effort, harvest, variances, and coefficients of variation by species in the Sitka King Salmon Derby from 24 to 26 May and from 31 May to 1 June 1986.

BOAT HOURS OF EFFORT	7840.0
VARIANCE	1152609.5
C.V.	13.7
CHIN >28 IN. ENTERED	316
VARIANCE	58850.8
C.V.	76.7
CHIN >28 IN. TAKEN HOME	11
VARIANCE	32.9
C.V.	50.8
CHIN >28 IN. RELEASED	6
VARIANCE	221.8
C.V.	263.8
CHIN <28 IN. ENTERED	0
VARIANCE	0.0
C.V.	0.0
CHIN <28 IN. TAKEN HOME	0
VARIANCE	0.0
C.V.	0.0
CHIN <28 IN. RELEASED	119
VARIANCE	482.9
C.V.	18.5
HALIBUT KEPT	215
VARIANCE	2313.7
C.V	22.4
HALIBUT RELEASED	73
VARIANCE	505.7
C.V.	30.6
DOLLY VARDEN KEPT	62
VARIANCE	155.9
C.V.	20.1
ROCKFISH KEPT	243
VARIANCE	5043.6
C.V.	29.3
ROCKFISH RELEASED	2540
VARIANCE	183675.9
C.V.	16.9

Table 14. Harvest by species and month of anglers fishing at the Yes Bay Resort near Ketchikan, Alaska from 15 May to 15 September 1986.

Month	Chinook <28 in.	Chinook >28 in.	Coho	Pink	Chum	Halibut	Steelhead
May	0	42	0	0	0	7	15
June	0	346	8	133	10	87	23
July	0	98	20	781	9	191	0
August	0	83	853	188	27	152	0
September	0	11	830	1	8	54	0
Totals	0	580	1,711	1,103	54	491	38

Table 15. Estimated effort and harvest by species in the Blind Slough SHA sport fishery from 2 June to 27 July 1986.

WEEK	ANGLER DAYS	ROD HOURS	CHIN <28 IN KEPT	CHIN >28 IN KEPT	CHIN <28 IN RELE	CHIN >28 IN RELE	DOLLY VARDEN KEPT	DOLLY VARDEN RELE	CUTTHROAT KEPT	CUTTHROAT RELE
8 6/02-6/08	59	125	5	5	0	5	7	2	3	48
9 6/09-6/15	162	455	28	17	5	2	22	106	13	80
10 6/16-6/22	224	649	32	33	7	22	8	66	0	19
11 6/23-6/29	278	726	35	42	12	6	44	0	4	0
12 6/30-7/06	238	766	42	104	20	30	4	0	0	0
13 7/07-7/13	146	348	24	35	0	14	0	0	0	0
14 7/14-7/20	214	585	39	106	38	170	4	8	0	0
15 7/21-7/27	72	182	5	4	4	7	13	4	0	0
TOTAL	1393	3835	210	346	86	256	102	186	20	147

Table 16. Estimated effort and harvest by species in the Thomas Basin SHA sport fishery from 2 June to 27 July 1986.

WEEK	ANGLER DAYS	ROD HOURS	CHIN <28IN KEPT	CHIN >28IN KEPT	CHIN <28IN RELE	CHIN >28IN RELE	COHO KEPT	PINK KEPT	CHUM	DOLLY VARDEN
8 6/02-6/08	90	161	0	6	0	0	0	0	0	0
9 6/09-6/15	206	286	0	9	0	0	0	0	0	0
10 6/16-6/22	354	567	0	17	0	0	0	0	0	0
11 6/23-6/29	192	292	0	15	0	0	0	0	0	0
12 6/30-7/06	253	329	0	45	0	0	0	0	0	0
13 7/07-7/13	179	359	0	26	0	0	0	0	0	0
14 7/14-7/20	195	359	0	40	0	0	0	0	0	0
15 7/21-7/27	154	396	0	44	0	0	0	0	0	0
TOTAL	1623	2749	0	202	0	0	0	0	0	0

Table 17. Estimated effort and harvest by species in selected Juneau roadside sport fisheries from 7 July to 29 September 1986.

SITE	ANGLER HOURS	DOLLY VARDEN	CUT-THROAT	COHO	PINK	CHUM
ECHO COVE	1890	39	0	0	522	0
COWEE CREEK	3763	492	13	168	971	0
NORTH BRIDGET COVE	0	0	0	0	0	0
SUNSHINE COVE	397	0	0	0	0	0
SUNRISE BEACH	749	13	0	0	46	0
END OF ROAD BLUFFS	147	0	0	0	0	0
EAGLE BEACH	170	58	0	0	0	0
SCOUT CAMP	774	0	0	0	97	0
AMALGA HARBOR	2196	125	0	136	95	26
PETERSON CREEK	284	104	0	52	0	0
SHRINE ISLAND	1442	0	0	32	0	0
POINT LOUISA	1742	0	0	197	330	0
AUKE BAY FLOATS	852	116	0	0	44	0
AUKE CREEK MOUTH	307	0	0	0	0	0
AUKE LAKE	34	0	0	0	0	0
MONTANA CREEK (UPPER)	682	123	0	0	0	0
MONTANA CREEK (MIDDLE)	182	126	0	0	0	0
MONTANA CREEK (LOWER)	886	94	127	75	0	17
TWIN LAKES	221	0	0	0	0	0
SALMON CREEK	4477	0	0	0	1387	1481
SHEEP CREEK	2163	29	0	0	2485	29
KOWEE CREEK	250	0	0	0	0	0
FISH CREEK	1226	391	167	28	335	23
NORTH DOUGLAS BOAT RAMP	170	0	0	0	0	0
PICNIC COVE	1487	29	0	0	77	0
PETERSON CREEK (O. P.)	0	0	0	0	0	0

Table 18. Estimated effort and harvest by species in selected Haines roadside sport fisheries from 14 July to 31 October 1986.

SITE	WEEK		ANGLER HOURS	DOLLY VARDEN	CUT-THROAT	COHO	PINK	SOCK-EYE	CHUM
CHILKOOT RIVER	14	7/14-7/20	2858	226	0	0	0	151	0
	15	7/21-7/27	2536	317	0	0	0	436	0
	16	7/28-8/03	3596	180	0	0	0	421	0
	17	8/04-8/10	3285	414	0	0	33	605	0
	18	8/11-8/17	3978	537	0	0	0	589	0
	19	8/18-8/24	3080	739	0	0	80	410	0
	20	8/25-8/31	2361	99	0	0	744	163	21
		9/01-10/31	10790	1429	0	708	565	98	32
	TOTAL		32484	3941	0	708	1422	2873	53
TANANI BAY / LUTAK INLET (SALTWATER)	14	7/14-7/20	327	109	0	0	0	0	0
	15	7/21-7/27	0	0	0	0	0	0	0
	16	7/28-8/03	313	67	0	0	201	0	0
	17	8/04-8/10	336	81	0	0	134	0	0
	18	8/11-8/17	217	0	0	0	179	0	0
	19	8/18-8/24	245	0	0	0	40	0	0
	20	8/25-8/31	33	0	0	0	0	0	0
	TOTAL		1471	257	0	0	554	0	0
CHILKAT RIVER		9/01-10/31	3061	85	0	194	0	0	496

Table 19. Estimated effort and harvest by species in selected Yakutat roadside fisheries from 14 April to 15 October 1986.

AREA	WEEK	ANGLER DAYS	ROD HOURS	STEELHEAD KEPT	STEELHEAD RELE	CHIN >16 IN	CHIN <16 IN	SOCKEYE	PINK	COHO	DOLLY VARDEN	RAINBOW
SITUK RIVER	1 4/14-4/20	446	2185	21	184	0	0	0	0	0	0	0
	2 4/21-4/27	373	2242	37	740	0	0	0	0	0	0	0
	3 4/28-5/04	347	2124	58	284	0	0	0	0	0	0	0
	4 5/05-5/11	326	1985	63	126	0	0	0	0	0	0	0
	5 5/12-5/18	126	562	42	536	0	0	0	0	0	0	0
	6 5/19-5/25	25	124	13	139	0	0	0	0	0	0	0
	7 5/26-6/01	37	116	5	16	0	0	0	0	0	16	0
	8 6/02-6/08	37	131	0	0	0	0	0	0	0	0	0
	9 6/09-6/15	68	200	16	0	0	0	5	0	0	5	0
	10 6/16-6/22	194	945	11	58	0	0	84	0	0	5	5
	11 6/23-6/29	383	1486	16	11	0	11	205	0	0	79	5
	12 6/30-7/06	26	184	5	0	0	0	5	0	0	0	0
	13 7/07-7/13	168	753	0	0	0	26	152	26	0	131	5
	14 7/14-7/20	84	270	0	0	0	0	37	37	0	26	0
	8/16-10/15	3101	12267	0	0	0	0	0	1211	1448	189	0
	TOTAL	5741	25573	287	2094	0	37	488	1274	1448	451	15
LOST RIVER	8/16-10/15	2499	8428	5	0	0	0	0	84	1339	10	0
ANKAU LAGOON	8/16-10/15	--	8083	0	0	0	0	0	0	1384	0	0

Table 20. Estimated effort and harvest of steelhead for selected Petersburg roadside sport fisheries from 14 April to 1 June 1986.

Area	Rod Hours	Steelhead Harvested	Steelhead Caught
Falls Creek	724	89	144
Blind Slough (Crystal Creek)	659	51	51
Ohmer Creek	565	99	103

Table 21. Weekly catch rates (fish per hour) in the Juneau marine sport fishery from 14 April to 5 October 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-FISH (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-FISH (TAR)
1	4/14-4/20	139	109	78.2	30	21.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	4/21-4/27	344	247	71.7	98	28.3	0.006	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000
3	4/28-5/04	1173	818	69.8	355	30.2	0.009	0.000	0.003	0.003	0.012	0.000	0.000	0.000	0.008	0.008
4	5/05-5/11	743	653	87.9	90	12.1	0.019	0.000	0.004	0.000	0.021	0.000	0.000	0.000	0.011	0.000
5	5/12-5/18	1419	1372	96.6	48	3.4	0.028	0.000	0.004	0.000	0.029	0.000	0.000	0.000	0.126	0.000
6	5/19-5/25	1360	1162	85.5	198	14.5	0.013	0.000	0.009	0.001	0.015	0.000	0.000	0.000	0.035	0.005
7	5/26-6/01	1922	1484	77.2	438	22.8	0.017	0.000	0.022	0.003	0.022	0.000	0.000	0.000	0.089	0.011
8	6/02-6/08	2145	1692	78.9	453	21.1	0.010	0.000	0.018	0.002	0.013	0.000	0.000	0.000	0.080	0.009
9	6/09-6/15	2566	1601	62.4	965	37.6	0.010	0.001	0.057	0.001	0.016	0.001	0.000	0.000	0.146	0.002
10	6/16-6/22	1649	905	54.9	744	45.1	0.012	0.001	0.063	0.007	0.022	0.000	0.002	0.000	0.130	0.015
11	6/23-6/29	4786	2354	49.2	2432	50.8	0.011	0.002	0.082	0.003	0.022	0.004	0.005	0.000	0.153	0.005
12	6/30-7/06	4038	1787	44.3	2250	55.7	0.011	0.003	0.091	0.004	0.025	0.006	0.010	0.004	0.156	0.008
13	7/07-7/13	3646	1860	51.0	1785	49.0	0.016	0.003	0.078	0.004	0.030	0.005	0.020	0.006	0.147	0.009
14	7/14-7/20	3354	2325	69.3	1029	30.7	0.031	0.003	0.056	0.007	0.043	0.003	0.017	0.003	0.154	0.022
15	7/21-7/27	3124	1960	62.7	1164	37.3	0.034	0.015	0.072	0.002	0.051	0.024	0.014	0.001	0.174	0.006
16	7/28-8/03	1270	798	62.9	472	37.1	0.048	0.028	0.093	0.001	0.075	0.043	0.013	0.005	0.239	0.002
17	8/04-8/10	4166	2824	67.8	1341	32.2	0.010	0.048	0.043	0.002	0.013	0.071	0.012	0.001	0.101	0.007
18	8/11-8/17	4155	3036	73.1	1119	26.9	0.015	0.101	0.048	0.005	0.021	0.138	0.006	0.005	0.158	0.016
19	8/18-8/24	3986	3160	79.3	826	20.7	0.007	0.096	0.038	0.001	0.008	0.121	0.004	0.003	0.165	0.004
20	8/25-8/31	2954	2398	81.2	555	18.8	0.011	0.130	0.037	0.001	0.013	0.156	0.002	0.004	0.169	0.000
21	9/01-9/07	4016	3001	74.7	1015	25.3	0.005	0.077	0.040	0.002	0.007	0.102	0.000	0.007	0.134	0.002
22	9/08-9/14	2350	1372	58.4	978	41.6	0.007	0.047	0.051	0.003	0.011	0.079	0.000	0.009	0.116	0.006
23	9/15-9/21	1133	646	57.0	488	43.0	0.005	0.029	0.033	0.004	0.009	0.043	0.000	0.000	0.072	0.008
24	9/22-9/28	309	98	31.7	211	68.3	0.013	0.003	0.065	0.003	0.041	0.010	0.000	0.010	0.095	0.000
25	9/29-10/05	57	23	40.6	34	59.4	0.017	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.088	0.000

Table 22. Weekly catch rates (fish per hour) in the Ketchikan marine sport fishery from 28 April to 28 September 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-FISH (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-FISH (TAR)
3	4/28-5/04	698	158	22.6	540	77.4	0.003	0.000	0.063	0.085	0.013	0.000	0.000	0.000	0.081	0.109
4	5/05-5/11	404	73	18.1	331	81.9	0.012	0.000	0.092	0.032	0.055	0.000	0.000	0.000	0.109	0.039
5	5/12-5/18	551	329	59.6	223	40.4	0.027	0.000	0.018	0.034	0.046	0.000	0.000	0.003	0.045	0.081
6	5/19-5/25	3481	3278	94.2	203	5.8	0.038	0.001	0.008	0.006	0.041	0.002	0.000	0.001	0.079	0.059
7	5/26-6/01	5694	5135	90.2	559	9.8	0.045	0.002	0.015	0.010	0.050	0.003	0.000	0.001	0.095	0.063
8	6/02-6/08	5094	4678	91.8	416	8.2	0.040	0.003	0.006	0.008	0.044	0.003	0.000	0.001	0.043	0.055
9	6/09-6/15	1683	1236	73.5	447	26.5	0.052	0.023	0.062	0.033	0.070	0.031	0.006	0.002	0.224	0.119
10	6/16-6/22	1092	790	72.3	302	27.7	0.057	0.017	0.034	0.023	0.077	0.024	0.008	0.001	0.116	0.073
11	6/23-6/29	1584	1014	64.0	571	36.0	0.034	0.071	0.060	0.040	0.053	0.110	0.040	0.003	0.149	0.109
12	6/30-7/06	2055	1529	74.4	526	25.6	0.045	0.134	0.051	0.018	0.060	0.177	0.132	0.005	0.175	0.040
13	7/07-7/13	1034	635	61.5	398	38.5	0.033	0.153	0.063	0.059	0.052	0.247	0.143	0.008	0.161	0.143
14	7/14-7/20	1858	1081	58.2	777	41.8	0.022	0.105	0.067	0.068	0.034	0.179	0.115	0.004	0.158	0.145
15	7/21-7/27	1210	742	61.3	468	38.7	0.026	0.136	0.076	0.037	0.042	0.220	0.210	0.003	0.188	0.092
16	7/28-8/03	1682	1121	66.7	561	33.3	0.030	0.151	0.077	0.030	0.041	0.226	0.256	0.004	0.219	0.071
17	8/04-8/10	1530	875	57.2	655	42.8	0.011	0.108	0.071	0.037	0.015	0.188	0.238	0.003	0.162	0.076
18	8/11-8/17	1828	1163	63.6	665	36.4	0.015	0.163	0.059	0.038	0.024	0.254	0.169	0.003	0.161	0.102
19	8/18-8/24	2405	1894	78.8	511	21.2	0.008	0.184	0.059	0.045	0.009	0.232	0.171	0.010	0.272	0.184
20	8/25-8/31	2190	1515	69.2	675	30.8	0.010	0.214	0.058	0.050	0.013	0.305	0.073	0.006	0.182	0.154
21	9/01-9/07	2974	2352	79.1	623	20.9	0.005	0.297	0.029	0.019	0.006	0.373	0.055	0.009	0.133	0.085
22	9/08-9/14	1503	1202	80.0	301	20.0	0.003	0.198	0.029	0.038	0.003	0.242	0.008	0.007	0.120	0.159
23	9/15-9/21	1137	588	51.7	549	48.3	0.007	0.082	0.043	0.084	0.003	0.153	0.000	0.003	0.089	0.135
24	9/22-9/28	307	118	38.4	189	61.6	0.007	0.065	0.052	0.049	0.000	0.169	0.000	0.000	0.085	0.079

Table 23. Weekly catch rates (fish per hour) in the Petersburg marine sport fishery from 14 April to 29 June 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-FISH (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-FISH (TAR)
1	4/14-4/20	33	20	58.6	14	41.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	4/21-4/27	45	19	42.2	26	57.8	0.022	0.000	0.067	0.000	0.053	0.000	0.000	0.000	0.115	0.000
3	4/28-5/04	209	140	67.1	69	32.9	0.005	0.000	0.019	0.000	0.007	0.000	0.000	0.000	0.044	0.000
4	5/05-5/11	191	137	71.8	54	28.2	0.010	0.000	0.031	0.005	0.007	0.000	0.000	0.000	0.111	0.019
5	5/12-5/18	389	320	82.3	69	17.7	0.015	0.000	0.023	0.000	0.019	0.000	0.000	0.000	0.116	0.000
6	5/19-5/25	1174	1138	96.9	37	3.1	0.045	0.000	0.006	0.001	0.047	0.000	0.000	0.000	0.027	0.000
7	5/26-6/01	749	737	98.4	12	1.6	0.045	0.000	0.003	0.044	0.046	0.000	0.000	0.000	0.000	2.500
8	6/02-6/08	389	355	91.3	34	8.7	0.054	0.000	0.015	0.003	0.059	0.000	0.000	0.000	0.148	0.030
9	6/09-6/15	446	355	79.7	91	20.3	0.063	0.000	0.043	0.009	0.079	0.000	0.000	0.000	0.210	0.044
10	6/16-6/22	262	189	72.3	72	27.7	0.095	0.000	0.053	0.000	0.127	0.000	0.000	0.000	0.193	0.000
11	6/23-6/29	496	306	61.6	191	38.4	0.022	0.000	0.048	0.000	0.036	0.000	0.000	0.000	0.089	0.000

Table 24. Weekly catch rates (fish per hour) in the Wrangell marine sport fishery from 14 April to 6 July 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-KEPT (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-KEPT (TAR)
1	4/14-4/20	72	50	69.7	22	30.3	0.000	0.000	0.042	0.028	0.000	0.000	0.000	0.000	0.138	0.092
2	4/21-4/27	98	50	50.5	49	49.5	0.000	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.082	0.000
3	4/28-5/04	134	105	78.1	29	21.9	0.007	0.000	0.007	0.000	0.010	0.000	0.000	0.000	0.034	0.000
4	5/05-5/11	357	340	95.2	17	4.8	0.034	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000
5	5/12-5/18	1336	1310	98.1	26	1.9	0.029	0.000	0.003	0.000	0.030	0.000	0.000	0.000	0.038	0.000
6	5/19-5/25	1755	1706	97.2	49	2.8	0.041	0.000	0.003	0.000	0.042	0.000	0.000	0.000	0.020	0.000
7	5/26-6/01	1496	1485	99.3	11	0.7	0.051	0.000	0.001	0.001	0.051	0.000	0.000	0.000	0.000	0.000
8	6/02-6/08	662	604	91.3	58	8.7	0.048	0.000	0.023	0.006	0.053	0.000	0.000	0.000	0.173	0.069
9	6/09-6/15	371	244	65.9	126	34.1	0.040	0.003	0.040	0.000	0.061	0.004	0.004	0.000	0.087	0.000
10	6/16-6/22	247	225	91.3	21	8.7	0.045	0.004	0.012	0.000	0.049	0.004	0.004	0.004	0.093	0.000
11	6/23-6/29	420	274	65.3	146	34.7	0.021	0.000	0.072	0.000	0.029	0.000	0.015	0.000	0.192	0.000
12	6/30-7/06	179	113	63.1	66	36.9	0.022	0.000	0.034	0.000	0.035	0.000	0.133	0.000	0.045	0.000

Table 25. Weekly catch rates (fish per hour) in the Haines marine sport fishery from 14 April to 13 July 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-FISH (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-FISH (TAR)
1	4/14-4/20	12	12	100.0	0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	---	---
2	4/21-4/27	24	24	100.0	0	0.0	0.042	0.000	0.000	0.000	0.042	0.000	0.000	0.000	---	---
3	4/28-5/04	187	184	98.4	3	1.6	0.011	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
4	5/05-5/11	231	230	99.8	1	0.2	0.004	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000
5	5/12-5/18	342	296	86.5	46	13.5	0.012	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000
6	5/19-5/25	299	296	99.0	3	1.0	0.037	0.000	0.000	0.000	0.037	0.000	0.000	0.000	0.000	0.000
7	5/26-6/01	161	161	100.0	0	0.0	0.075	0.000	0.006	0.000	0.075	0.000	0.000	0.000	---	---
8	6/02-6/08	1906	1876	98.5	30	1.5	0.046	0.000	0.005	0.001	0.046	0.000	0.000	0.000	0.068	0.034
9	6/09-6/15	1149	1136	98.8	14	1.2	0.069	0.000	0.004	0.000	0.070	0.000	0.000	0.000	0.000	0.000
10	6/16-6/22	791	721	91.2	70	8.8	0.072	0.000	0.019	0.000	0.078	0.000	0.001	0.000	0.171	0.000
11	6/23-6/29	563	490	87.1	73	12.9	0.060	0.000	0.028	0.000	0.069	0.000	0.000	0.000	0.138	0.000
12	6/30-7/06	215	173	80.5	42	19.5	0.047	0.000	0.000	0.000	0.058	0.000	0.000	0.000	0.000	0.000
13	7/07-7/13	31	0	0.0	31	100.0	0.000	0.000	0.065	0.000	---	---	---	---	0.065	0.000

Table 26. Weekly catch rates (fish per hour) in the Sitka marine sport fishery from 14 April to 29 June 1986.

	WEEK	ROD HOURS	SALMON HOURS	% SALMON HOURS	BOTTOM HOURS	% BOTTOM HOURS	CHI-NOOK (NON)	COHO (NON)	HAL-IBUT (NON)	ROCK-FISH (NON)	CHI-NOOK (TAR)	COHO (TAR)	PINK (TAR)	CHUM (TAR)	HAL-IBUT (TAR)	ROCK-FISH (TAR)
1	4/14-4/20	13	0	0.0	13	100.0	0.000	0.000	0.154	0.000	---	---	---	---	0.154	0.000
2	4/21-4/27	26	21	81.8	5	18.2	0.156	0.000	0.000	0.000	0.190	0.000	0.000	0.000	0.000	0.000
3	4/28-5/04	66	21	31.9	45	68.1	0.000	0.000	0.000	0.381	0.000	0.000	0.000	0.000	0.000	0.560
4	5/05-5/11	84	64	76.6	20	23.4	0.012	0.000	0.012	0.000	0.016	0.000	0.000	0.000	0.051	0.000
5	5/12-5/18	106	85	80.2	21	19.8	0.019	0.000	0.019	0.028	0.023	0.000	0.000	0.000	0.000	0.143
6	5/19-5/25	33	22	67.7	11	32.3	0.154	0.000	0.000	0.123	0.227	0.000	0.000	0.000	0.000	0.381
7	5/26-6/01	19	5	24.3	15	75.7	0.000	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.069	0.000
8	6/02-6/08	194	133	68.6	61	31.4	0.000	0.000	0.088	0.031	0.000	0.000	0.000	0.000	0.198	0.033
9	6/09-6/15	420	233	55.4	187	44.6	0.024	0.000	0.074	0.040	0.043	0.000	0.000	0.009	0.160	0.085
10	6/16-6/22	277	133	48.0	144	52.0	0.011	0.004	0.195	0.050	0.023	0.008	0.000	0.000	0.346	0.090
11	6/23-6/29	341	218	64.1	122	35.9	0.009	0.003	0.076	0.041	0.014	0.005	0.005	0.000	0.172	0.090

Table 27. Weekly catch rates (fish per hour) in the Blind Slough SHA sport fishery from 2 June to 27 July 1986.

WEEK		ROD HOURS	CHIN <28 IN KEPT	CHIN >28 IN KEPT	CHIN <28 IN RELE	CHIN >28 IN RELE	DOLLY VARDEN KEPT	DOLLY VARDEN RELE	CUTTHROAT KEPT	CUTTHROAT RELE
8	6/02-6/08	40.9	0.024	0.024	0.000	0.024	0.049	0.024	0.049	0.733
9	6/09-6/15	231.6	0.069	0.039	0.013	0.004	0.060	0.220	0.035	0.086
10	6/16-6/22	224.8	0.049	0.044	0.013	0.040	0.009	0.085	0.000	0.027
11	6/23-6/29	251.6	0.052	0.068	0.012	0.008	0.044	0.000	0.004	0.000
12	6/30-7/06	289.5	0.066	0.152	0.035	0.048	0.003	0.000	0.000	0.000
13	7/07-7/13	124.5	0.096	0.129	0.000	0.072	0.000	0.000	0.000	0.000
14	7/14-7/20	238.3	0.059	0.189	0.055	0.327	0.004	0.008	0.000	0.000
15	7/21-7/27	52.5	0.038	0.019	0.019	0.038	0.095	0.019	0.000	0.000

Table 28. Weekly catch rates (fish per hour) in the Thomas Basin SHA sport fishery from 2 June to 27 July 1986.

WEEK		ROD HOURS	CHIN <28 IN KEPT	CHIN >28 IN KEPT	CHIN <28 IN RELE	CHIN >28 IN RELE	COHO	PINK	CHUM	DOLLY VARDEN
8	6/02-6/08	29	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000
9	6/09-6/15	124	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000
10	6/16-6/22	184	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.000
11	6/23-6/29	94	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.000
12	6/30-7/06	119	0.000	0.143	0.000	0.000	0.000	0.000	0.000	0.000
13	7/07-7/13	116	0.000	0.078	0.000	0.000	0.000	0.000	0.000	0.000
14	7/14-7/20	115	0.000	0.113	0.000	0.000	0.000	0.000	0.000	0.000
15	7/21-7/27	107	0.000	0.103	0.000	0.000	0.000	0.000	0.000	0.000

Table 29. Weekly catch rates (fish per hour) of selected Juneau roadside sport fisheries from 7 July to 28 September 1986.

SITE		WEEK	ROD HOURS	PINK	COHO	CUT-THROAT	DOLLY VARDEN	CHUM
ECHO COVE	13	7/07-7/13	4.0	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	25.5	0.314	0.000	0.000	0.000	0.000
	15	7/21-7/27	27.3	0.403	0.000	0.000	0.037	0.000
	16	7/28-8/03	10.5	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	1.0	0.000	0.000	0.000	0.000	0.000
	20	8/25-8/31	1.0	0.000	0.000	0.000	0.000	0.000
COWEE CREEK	13	7/07-7/13	4.5	0.000	0.000	0.000	0.222	0.000
	14	7/14-7/20	1.5	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	3.2	0.946	0.000	0.000	0.000	0.000
	16	7/28-8/03	9.3	1.071	0.000	0.000	0.000	0.000
	17	8/04-8/10	1.4	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	14.2	0.353	0.000	0.000	0.141	0.000
	19	8/18-8/24	7.7	0.261	0.000	0.000	0.000	0.000
	20	8/25-8/31	4.3	0.000	0.000	0.000	0.471	0.000
	21	9/01-9/07	12.2	0.000	0.082	0.000	0.654	0.000
	22	9/08-9/14	21.6	0.000	0.000	0.000	0.185	0.000
	23	9/15-9/21	2.8	0.000	0.000	0.000	0.362	0.000
	24	9/22-9/28	68.1	0.000	0.132	0.015	0.015	0.000
NORTH BRIDGET COVE	20	8/25-8/31	6.0	0.000	0.000	0.000	0.000	0.000
SUNSHINE COVE	13	7/07-7/13	0.7	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	1.2	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	1.2	0.000	0.000	0.000	0.000	0.000
	20	8/25-8/31	8.0	0.000	0.000	0.000	0.000	0.000
SUNRISE BEACH	13	7/07-7/13	2.5	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	3.0	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	19.8	0.051	0.000	0.000	0.051	0.000
	20	8/25-8/31	0.9	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	6.0	0.000	0.000	0.000	0.000	0.000
	24	9/22-9/28	1.0	0.000	0.000	0.000	0.000	0.000
END OF ROAD BLUFFS	14	7/14-7/20	0.8	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	2.0	0.000	0.000	0.000	0.000	0.000
EAGLE BEACH	13	7/07-7/13	3.2	0.000	0.000	0.000	0.633	0.000
	14	7/14-7/20	2.8	0.000	0.000	0.000	0.000	0.000
SCOUT CAMP	13	7/07-7/13	5.4	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	0.5	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	2.5	0.400	0.000	0.000	0.000	0.000
	21	9/01-9/07	0.3	0.000	0.000	0.000	0.000	0.000

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Table 29. Weekly catch rates (fish per hour) of selected Juneau roadside sport fisheries from 7 July to 28 September 1986.

SITE		WEEK	ROD HOURS	PINK	COHO	CUT-THROAT	DOLLY VARDEN	CHUM
AMALGA HARBOR	13	7/07-7/13	1.7	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	1.0	0.000	0.000	0.000	0.000	0.000
	16	7/28-8/03	7.5	0.133	0.000	0.000	0.133	0.000
	17	8/04-8/10	7.2	0.000	0.000	0.000	0.000	0.139
	18	8/11-8/17	1.5	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	3.3	0.000	0.000	0.000	0.000	0.000
	20	8/25-8/31	24.3	0.082	0.000	0.000	0.082	0.000
	21	9/01-9/07	7.3	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	1.0	0.000	0.000	0.000	0.000	0.000
	23	9/15-9/21	7.1	0.000	0.565	0.000	0.000	0.000
PETERSON CREEK	15	7/21-7/27	4.3	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	0.3	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	0.5	0.000	0.000	0.000	0.000	0.000
	24	9/22-9/28	2.3	0.000	0.429	0.000	0.858	0.000
SHRINE ISLAND	13	7/07-7/13	2.0	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	1.5	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	1.2	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	8.9	0.000	0.112	0.000	0.000	0.000
	21	9/01-9/07	0.2	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	6.0	0.000	0.000	0.000	0.000	0.000
	23	9/15-9/21	0.3	0.000	0.000	0.000	0.000	0.000
POINT LOUISA	14	7/14-7/20	6.5	0.461	0.000	0.000	0.000	0.000
	15	7/21-7/27	5.2	0.388	0.000	0.000	0.000	0.000
	16	7/28-8/03	0.3	0.000	0.000	0.000	0.000	0.000
	17	8/04-8/10	5.8	0.000	0.171	0.000	0.000	0.000
	18	8/11-8/17	1.0	0.000	0.000	0.000	0.000	0.000
	20	8/25-8/31	6.6	0.152	0.152	0.000	0.000	0.000
	21	9/01-9/07	1.9	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	0.8	0.000	0.000	0.000	0.000	0.000
	23	9/15-9/21	2.8	0.000	0.364	0.000	0.000	0.000
AUKE BAY FLOATS	14	7/14-7/20	0.1	0.000	0.000	0.000	0.000	0.000
	16	7/28-8/03	2.0	0.000	0.000	0.000	0.000	0.000
	17	8/04-8/10	0.2	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	6.0	0.167	0.000	0.000	0.333	0.000
	20	8/25-8/31	1.9	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	10.0	0.000	0.000	0.000	0.100	0.000
	22	9/08-9/14	4.8	0.000	0.000	0.000	0.000	0.000
AUKE CREEK MOUTH	17	8/04-8/10	7.8	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	2.0	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	1.8	0.000	0.000	0.000	0.000	0.000

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Table 29. Weekly catch rates (fish per hour) of selected Juneau roadside sport fisheries from 7 July to 28 September 1986.

SITE		WEEK	ROD HOURS	PINK	COHO	CUT-THROAT	DOLLY VARDEN	CHUM
AUKE LAKE	21	9/01-9/07	0.2	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	0.6	0.000	0.000	0.000	0.000	0.000
MONTANA CREEK (UPPER)	13	7/07-7/13	0.8	0.000	0.000	0.000	2.381	0.000
	15	7/21-7/27	3.3	0.000	0.000	0.000	0.000	0.299
	17	8/04-8/10	8.1	0.000	0.000	0.000	0.247	0.000
	21	9/01-9/07	0.9	0.000	0.000	0.000	0.000	0.000
	24	9/22-9/28	3.0	0.000	0.000	0.000	0.000	0.000
MONTANA CREEK (MIDDLE)	14	7/14-7/20	0.2	0.000	0.000	0.000	5.882	0.000
	17	8/04-8/10	1.0	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	0.6	0.000	0.000	0.000	0.000	0.000
MONTANA CREEK (LOWER)	13	7/07-7/13	60.8	0.000	0.000	0.000	0.148	0.000
	14	7/14-7/20	0.2	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	7.0	0.000	0.000	0.000	0.429	0.143
	17	8/04-8/10	4.1	0.000	0.000	0.000	0.245	0.000
	19	8/18-8/24	0.6	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	8.7	0.000	0.462	0.693	0.000	0.000
	23	9/15-9/21	13.8	0.000	0.218	0.073	0.000	0.000
	24	9/22-9/28	5.8	0.000	0.348	0.522	0.174	0.000
TWIN LAKES	13	7/07-7/13	1.2	0.000	0.000	0.000	0.000	0.000
	16	7/28-8/03	1.3	0.000	0.000	0.000	0.000	0.000
SALMON CREEK	14	7/14-7/20	7.9	0.000	0.000	0.000	0.000	0.378
	15	7/21-7/27	30.0	0.000	0.000	0.000	0.000	0.200
	16	7/28-8/03	17.4	0.000	0.000	0.000	0.000	0.691
	17	8/04-8/10	13.4	0.298	0.000	0.000	0.000	0.223
	19	8/18-8/24	2.5	4.016	0.000	0.000	0.000	0.000
	20	8/25-8/31	3.5	2.279	0.000	0.000	0.000	0.000
	21	9/01-9/07	2.1	0.000	0.000	0.000	0.000	0.000
SHEEP CREEK	13	7/07-7/13	4.3	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	1.0	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	0.8	0.000	0.000	0.000	0.000	0.000
	17	8/04-8/10	23.1	1.040	0.000	0.000	0.043	0.043
	18	8/11-8/17	3.1	0.325	0.000	0.000	0.000	0.000
	19	8/18-8/24	21.2	1.695	0.000	0.000	0.000	0.000
	20	8/25-8/31	2.7	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	4.0	2.000	0.000	0.000	0.000	0.000
	23	9/15-9/21	0.8	0.000	0.000	0.000	0.000	0.000

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Table 29. Weekly catch rates (fish per hour) of selected Juneau roadside sport fisheries from 7 July to 28 September 1986.

SITE	WEEK		ROD HOURS	PINK	COHO	CUT-THROAT	DOLLY VARDEN	CHUM
KOWEE CREEK	13	7/07-7/13	0.5	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	0.5	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	0.3	0.000	0.000	0.000	0.000	0.000
FISH CREEK	13	7/07-7/13	1.5	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	3.0	0.000	0.000	0.000	0.000	0.000
	15	7/21-7/27	9.8	0.000	0.000	0.102	0.407	0.102
	16	7/28-8/03	2.0	0.000	0.000	0.000	1.000	0.000
	19	8/18-8/24	24.7	0.445	0.000	0.040	0.283	0.000
	20	8/25-8/31	1.2	0.862	0.000	0.000	0.000	0.000
	23	9/15-9/21	4.0	0.000	0.250	1.000	0.250	0.000
NORTH DOUGLAS BOAT RAMP	14	7/14-7/20	1.0	0.000	0.000	0.000	0.000	0.000
	17	8/04-8/10	0.4	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	2.0	0.000	0.000	0.000	0.000	0.000
PICNIC COVE	13	7/07-7/13	0.3	0.000	0.000	0.000	0.000	0.000
	14	7/14-7/20	17.6	0.000	0.000	0.000	0.114	0.000
	15	7/21-7/27	30.0	0.167	0.000	0.000	0.000	0.000
	16	7/28-8/03	8.6	0.000	0.000	0.000	0.000	0.000
	17	8/04-8/10	16.9	0.000	0.000	0.000	0.000	0.000
	18	8/11-8/17	2.3	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	3.2	0.000	0.000	0.000	0.000	0.000
	21	9/01-9/07	2.0	0.000	0.000	0.000	0.000	0.000
	22	9/08-9/14	1.0	0.000	0.000	0.000	0.000	0.000

Table 30. Weekly catch rates (fish per hour) of selected Haines roadside sport fisheries from 14 July to 31 October 1986.

SITE	WEEK		ROD HOURS	PINK	COHO	CUT-THROAT	DOLLY VARDEN	SOCKEYE	CHUM
CHILKOOT RIVER	14	7/14-7/20	266	0.000	0.000	0.000	0.079	0.053	0.000
	15	7/21-7/27	169	0.000	0.000	0.000	0.125	0.172	0.000
	16	7/28-8/03	222	0.000	0.000	0.000	0.050	0.117	0.000
	17	8/04-8/10	311	0.010	0.000	0.000	0.126	0.184	0.000
	18	8/11-8/17	230	0.000	0.000	0.000	0.135	0.148	0.000
	19	8/18-8/24	196	0.026	0.000	0.000	0.240	0.133	0.000
	20	8/25-8/31	216	0.315	0.000	0.000	0.042	0.069	0.009
	21	9/01-9/07	150	0.328	0.000	0.000	0.234	0.087	0.000
	22	9/08-9/14	144	0.181	0.021	0.000	0.125	0.007	0.014
	23	9/15-9/21	230	0.070	0.061	0.000	0.187	0.009	0.013
	24	9/22-9/28	377	0.024	0.061	0.000	0.095	0.003	0.003
	25	9/29-10/05	335	0.000	0.104	0.000	0.048	0.000	0.000
	26	10/06-10/12	377	0.000	0.058	0.000	0.111	0.000	0.000
	27	10/13-10/19	81	0.000	0.037	0.000	0.384	0.012	0.000
	28	10/20-10/26	24	0.000	0.208	0.000	0.458	0.042	0.000
CHILKAT RIVER	22	9/08-9/14	9	0.000	0.000	0.000	0.000	0.000	0.000
	23	9/15-9/21	45	0.000	0.066	0.000	0.044	0.000	0.044
	24	9/22-9/28	71	0.000	0.014	0.000	0.028	0.000	0.197
	25	9/29-10/05	98	0.000	0.144	0.000	0.010	0.000	0.133
	26	10/06-10/12	237	0.000	0.025	0.000	0.008	0.000	0.211
	27	10/13-10/19	35	0.000	0.028	0.000	0.085	0.000	0.198
	28	10/20-10/26	5	0.000	0.000	0.000	0.600	0.000	0.600
	29	10/27-11/02	1	0.000	0.000	0.000	0.000	0.000	0.000
TANANI BAY / LUTAK INLET (SALTWATER)	14	7/14-7/20	12	0.000	0.000	0.000	0.334	0.000	0.000
	16	7/28-8/03	5	0.644	0.000	0.000	0.215	0.000	0.000
	17	8/04-8/10	13	0.400	0.000	0.000	0.240	0.000	0.000
	18	8/11-8/17	5	0.826	0.000	0.000	0.000	0.000	0.000
	19	8/18-8/24	12	0.162	0.000	0.000	0.000	0.000	0.000

Table 31. Weekly catch rates (fish per hour) of selected Yakutat roadside sport fisheries from 14 April to 15 October 1986.

AREA	WEEK		ROD HOURS	CHIN> 16 IN	CHIN< 16 IN	STEELHD KEPT	STEELHD RELE	COHO	SOCKEYE	PINK	DOLLY VARDEN	RAINBOW
SITUK RIVER	1	4/14-4/20	416	0.000	0.000	0.010	0.084	0.000	0.000	0.000	0.000	0.000
	2	4/21-4/27	427	0.000	0.000	0.016	0.330	0.000	0.000	0.000	0.000	0.000
	3	4/28-5/04	405	0.000	0.000	0.027	0.133	0.000	0.000	0.000	0.000	0.000
	4	5/05-5/11	378	0.000	0.000	0.032	0.063	0.000	0.000	0.000	0.000	0.000
	5	5/12-5/18	54	0.000	0.000	0.075	0.953	0.000	0.000	0.000	0.000	0.000
	6	5/19-5/25	30	0.000	0.000	0.102	1.119	0.000	0.000	0.000	0.000	0.000
	7	5/26-6/01	22	0.000	0.000	0.045	0.136	0.000	0.000	0.000	0.136	0.000
	8	6/02-6/08	25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	9	6/09-6/15	38	0.000	0.000	0.079	0.000	0.000	0.026	0.000	0.026	0.000
	10	6/16-6/22	180	0.000	0.000	0.011	0.061	0.000	0.089	0.000	0.006	0.006
	11	6/23-6/29	283	0.000	0.007	0.011	0.007	0.000	0.138	0.000	0.053	0.004
	12	6/30-7/06	35	0.000	0.000	0.029	0.000	0.000	0.029	0.000	0.000	0.000
	13	7/07-7/13	144	0.000	0.035	0.000	0.000	0.000	0.202	0.035	0.174	0.007
	14	7/14-7/20	52	0.000	0.000	0.000	0.000	0.000	0.136	0.136	0.097	0.000
	19	8/18-8/24	630	0.000	0.000	0.000	0.000	0.092	0.000	0.316	0.054	0.000
	20	8/25-8/31	461	0.000	0.000	0.000	0.000	0.152	0.000	0.022	0.004	0.000
	21	9/01-9/07	291	0.000	0.000	0.000	0.000	0.096	0.000	0.007	0.000	0.000
	22	9/08-9/14	429	0.000	0.000	0.000	0.000	0.082	0.000	0.002	0.005	0.000
	23	9/15-9/21	306	0.000	0.000	0.000	0.000	0.082	0.000	0.010	0.003	0.000
	24	9/22-9/28	146	0.000	0.000	0.000	0.000	0.240	0.000	0.000	0.000	0.000
	25	9/29-10/05	60	0.000	0.000	0.000	0.000	0.067	0.000	0.000	0.000	0.000

-Continued-

Table 31. Weekly catch rates (fish per hour) of selected Yakutat roadside sport fisheries from 14 April to 15 October 1986.

AREA	WEEK		ROD HOURS	CHIN> 16 IN	CHIN< 16 IN	STEELHD KEPT	STEELHD RELE	COHO	SOCKEYE	PINK	DOLLY VARDEN	RAINBOW
LOST RIVER--	19	8/18-8/24	65	0.000	0.000	0.000	0.000	0.231	0.000	0.062	0.000	0.000
TAWAH CREEK	20	8/25-8/31	241	0.000	0.000	0.000	0.000	0.179	0.000	0.033	0.008	0.000
	21	9/01-9/07	317	0.000	0.000	0.000	0.000	0.076	0.000	0.006	0.000	0.000
	22	9/08-9/14	183	0.000	0.000	0.000	0.000	0.137	0.000	0.005	0.000	0.000
	23	9/15-9/21	512	0.000	0.000	0.000	0.000	0.109	0.000	0.000	0.000	0.000
	24	9/22-9/28	221	0.000	0.000	0.005	0.000	0.231	0.000	0.000	0.000	0.000
	25	9/29-10/05	89	0.000	0.000	0.000	0.000	0.292	0.000	0.000	0.000	0.000
	26	10/06-10/12	27	0.000	0.000	0.000	0.000	0.222	0.000	0.000	0.000	0.000
ANKAU LAGOON	20	8/25-8/31	31	0.000	0.000	0.000	0.000	0.290	0.000	0.000	0.000	0.000
	21	9/01-9/07	21	0.000	0.000	0.000	0.000	0.049	0.000	0.000	0.000	0.000
	22	9/08-9/14	291	0.000	0.000	0.000	0.000	0.175	0.000	0.000	0.000	0.000
	23	9/15-9/21	192	0.000	0.000	0.000	0.000	0.146	0.000	0.000	0.000	0.000
	24	9/22-9/28	31	0.000	0.000	0.000	0.000	0.161	0.000	0.000	0.000	0.000
	25	9/29-10/05	48	0.000	0.000	0.000	0.000	0.229	0.000	0.000	0.000	0.000

Table 32. Estimated effort and harvest of the Juneau Golden North Salmon Derby, 1971 to 1986.

Year	Dates Held	Angler Validation [1]	Chinook Salmon			Coho Salmon			Pink Salmon			Chum Salmon			Sockeye Salmon		
			Entered	Kept	Total	Entered	Kept	Total	Entered	Kept	Total	Entered	Kept	Total	Entered	Kept	Total
1971	7/16-7/18	7,434	682	-	-	1,331	-	-	409	-	-	226	-	-	-	-	-
1972	7/21-7/23	8,199	528	-	-	1,817	-	-	328	-	-	123	-	-	-	-	-
1973	7/20-7/22	7,915	637	-	-	449	-	-	278	-	-	34	-	-	-	-	-
1974	7/26-7/28	7,714	291	-	-	1,526	-	-	226	-	-	24	-	-	-	-	-
1975	7/18-7/20	7,847	276	184	460	315	354	669	174	531	705	15	14	29	0	0	0
1976	7/23-7/25	8,466	136	167	303	536	1,135	1,671	58	96	154	4	12	16	1	0	1
1977	8/05-8/07	8,762	161	355	516	1,206	2,419	3,625	259	55	314	28	1	29	1	1	2
1978	8/11-8/13	8,283	210	40	250	1,779	1,076	2,855	122	98	220	13	9	22	0	0	0
1979	8/03-8/05	8,327	350	657	1,007	663	2,561	3,224	98	242	340	52	44	96	0	5	5
1980	8/22-8/24	7,386	271	206	477	694	1,583	2,277	67	145	212	97	33	130	0	0	0
1981	8/07-8/09	7,524	436	437	873	541	1,223	1,764	104	186	290	22	3	25	0	0	0
1982	8/13-8/15	9,067	407	609	1,016	1,640	3,680	5,320	500	1,487	1,987	15	0	15	0	0	0
1983	8/05-8/07	10,775	310	562	872	1,243	1,721	2,964	728	763	1,491	57	86	143	7	10	17
1984	8/03-8/05	12,832	764	91	855	961	634	1,594	457	119	576	100	0	100	6	0	6
1985	8/09-8/11	12,423	1,020	202	1,222	2,350	569	2,919	2,550	776	3,326	160	13	176	0	8	8
1986	8/01-8/03	-	752	321	1,073	245	122	367	0	213	213	3	14	17	3	0	3

[1] Angler validations number of Derby tickets sold not comparable in 1986 because 1-day validation requirement changed to 1 or 3-day validation.

Table 33. Chinook salmon catch rates (chinook retained per rod-hour of non-targeted effort) in the Juneau marine sport fishery, 1960 to 1986. [1]

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	Seasonal Mean [2]
Dates [2]	4/15–4/30	5/01–5/14	5/15–5/28	5/29–6/11	6/12–6/25	6/26–7/09	7/10–7/23	7/24–8/06	8/07–8/20	8/21–9/03	9/04–9/17	9/18–10/01	10/02–10/15	05/01–09/03
1960	...	.092	.047	.072	.063	.065	.033	.020	.031	.008	.000	...	...	.049
1961	...	.051	.064	.060	.034	.036	.029	.035	.020	.005	...	...	...	.036
1962	...	.022	.033	.030	.014	.003	.014	.034	.008	.015	...	...	...	.016
1963	...	.090	.089	.086	.048	.060	.045	.030	.019	.020	.013	...	...	.046
1964	...	.075	.070	.065	.053	.045	.078	.039	.022	.013	...	...	...	.054
1965	...	.055	.069	.059	.028	.027	.037	.032	.014	.013	...	...	...	.035
1966	...	.000	.036	.026	.033	.027	.020	.022	.028	.034	...	...	...	.029
1967	...	.008	.031	.045	.035	.032	.025	.019	.012	.018	...	...	...	.030
1968	...	...	...	.028	.033	.036	.048	.035	.028	.023	...	...	...	.037
1969	...	...	...	.036	.047	.048	.034	.033	.030	...	...	...	...	.038
1970	...	...	...	.046	.025	.016	.028	.015	.017	.013	...	...	...	.021
1971	...	.014	.041	.052	.038	.032	.034	.033	.040	.027	.015	...	...	.015
1972	...	...	...	.016	.031	.023	.033	.029	.049	.024	.028	...	...	.029
1973	...	.050	.029	.032	.035	.048	.057	.029	.012	.023	...	...	...	.030
1974	...	.007	.017	.015	.036	.031	.017	.018	.014	.017	.017	...	...	.020
1975	...	.030	.018	.034	.022	.018	.030	.007	.007	.002	.004	.004	...	.012
1976	...	.023	.026	.024	.030	.020	.016	.007	.006	.006	.003	.002	.000	.013
1977	...	.015	.032	.023	.025	.011	.016	.010	.001	.003	.003	.000	...	.016
1978	...	.037	.029	.024	.023	.008	.004	.005	.001	.004	.002	.000	...	.013
1979	...	.032	.037	.019	.016	.009	.021	.010	.004	.008	.004	.001	...	.015
1980	...	.028	.036	.033	.024	.019	.013	.014	.010	.008	.010	.009	...	.019
1981	...	.036	.024	.025	.020	.013	.016	.009	.007	.008	.006	.004	...	.016
1982	...	.019	.023	.029	.015	.024	.014	.012	.008	.019	.019	.027	...	.017
1983	.002	.016	.020	.012	.020	.014	.018	.010	.008	.009	.012	.007	...	.013
1984	...	.019	.029	.019	.023	.035	.031	.022	.015	.012	.011	.024	...	.023
1985	.021	.033	.023	.023	.024	.019	.032	.044	.031	.009	.011	.010	...	.026
1986	.004	.013	.021	.013	.011	.011	.023	.038	.012	.009	.006	.007	...	.016

[1] Excludes derby data.

[2] Actual dates for each period may slightly vary between years.

Table 34. Coho salmon catch rates (coho retained per rod-hour of non-targeted effort) in the Juneau marine sport fishery, 1960 to 1986.

Period	1	2	3	4	5	6	7	8	9	10	11	12	13	Seasonal
Dates [1]	4/15–4/30	5/01–5/14	5/15–5/28	5/29–6/11	6/12–6/25	6/26–7/09	7/10–7/23	7/24–8/06	8/07–8/20	8/21–9/03	9/04–9/17	9/18–10/01	10/02–10/15	Mean [2] (6/26–9/03)
1960	...	.000	.000	.003	.002	.003	.009	.055	.065	.092	.034	...	...	.045
1961	...	.000	.000	.000	.001	.006	.042	.079	.054	.100	...	...	...	.056
1962	...	.000	.000	.000	.010	.002	.014	.034	.086	.126	...	...	...	.052
1963	...	.000	.000	.002	.006	.020	.044	.102	.145	.121	.143	...	...	.086
1964	...	.000	.001	.002	.004	.035	.041	.099	.095	.131	...	...	...	.080
1965	...	.000	.000	.015	.007	.026	.074	.093	.114	.108	...	...	...	.083
1966	...	.000	.000	.001	.002	.019	.028	.049	.085	.063	...	...	...	.049
1967	...	.000	.000	.000	.006	.015	.019	.034	.074	.063	...	...	...	.041
1968	...	...	...	.000	.061	.072	.119	.143	.149	.232	...	...	...	.133
1969	...	...	...	.000	.012	.026	.030	.081	.099	...	...	...	...	.059
1970	...	...	...	.002	.002	.021	.042	.057	.100	.106	...	...	...	.065
1971	...	.000	.000	.002	.005	.013	.038	.080	.087	.073	.196	...	...	.058
1972	...	...	...	.000	.051	.093	.102	.237	.127	.133	.120	...	...	.142
1973	...	...	.000	.005	.006	.023	.023	.034	.061	.096	...	...	...	.047
1974	...	.000	.002	.001	.008	.044	.066	.087	.089	.092	.133	...	...	.076
1975	...	.000	.000	.004	.002	.025	.036	.061	.097	.066	.081	.060	...	.059
1976	...	.000	.000	.002	.006	.029	.040	.054	.063	.079	.065	.060	.005	.053
1977	...	.000	.001	.000	.013	.044	.081	.068	.058	.056	.045	.016	...	.061
1978	...	.000	.000	.000	.015	.065	.092	.129	.143	.106	.065	.055	...	.107
1979	...	.000	.000	.000	.002	.014	.037	.039	.043	.090	.078	.003	...	.041
1980	...	.000	.000	.001	.001	.015	.047	.068	.089	.083	.057	.060	...	.055
1981	...	.000	.000	.000	.000	.021	.034	.046	.085	.101	.067	.018	...	.034
1982	...	.000	.000	.002	.007	.069	.084	.112	.147	.153	.105	.031	...	.113
1983	.000	.000	.000	.000	.002	.003	.034	.054	.078	.109	.102	.061	...	.063
1984	...	.000	.000	.000	.002	.009	.027	.024	.060	.138	.096	.017	...	.050
1985	.000	.000	.000	.000	.002	.032	.067	.061	.082	.135	.097	.076	...	.073
1986	.000	.000	.000	.000	.001	.002	.003	.019	.074	.110	.066	.023	...	.043

[1] Actual dates for each period may vary slightly between years.

[2] Excludes derby data

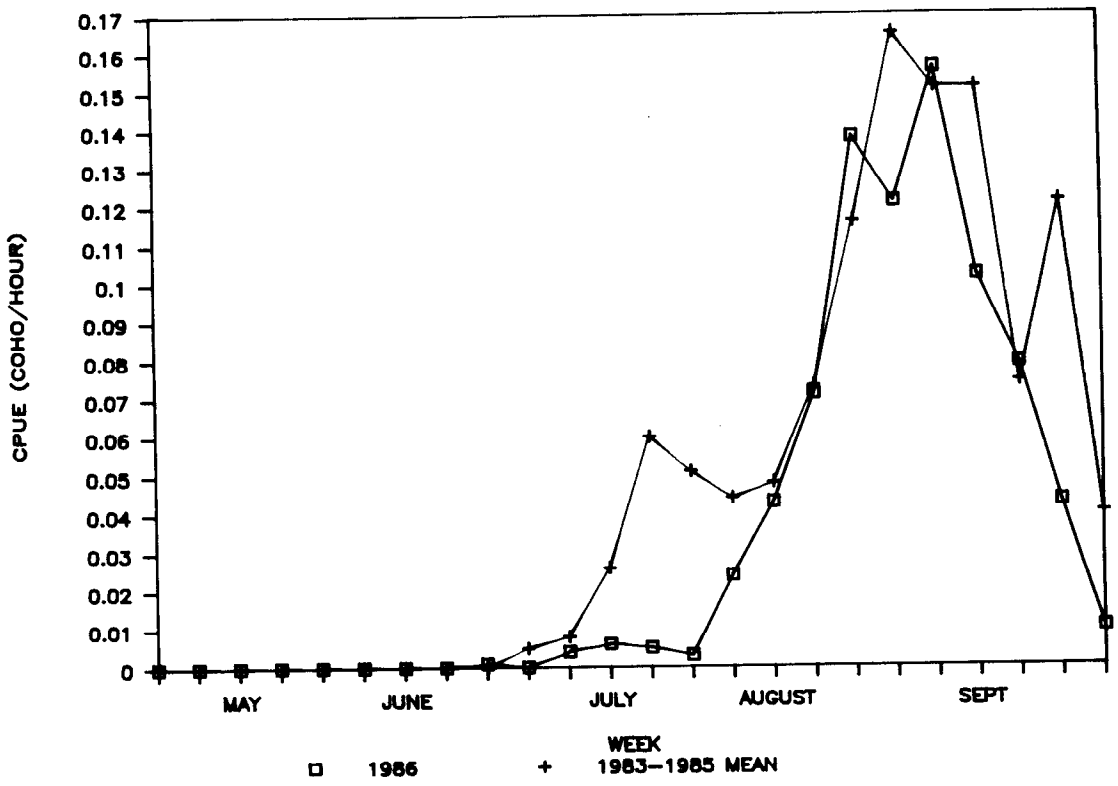

Figure 9. Coho salmon catch rates (fish per rod-hour of targeted effort) for the Juneau marine sport fishery in 1986 compared to 1983 to 1985 average.

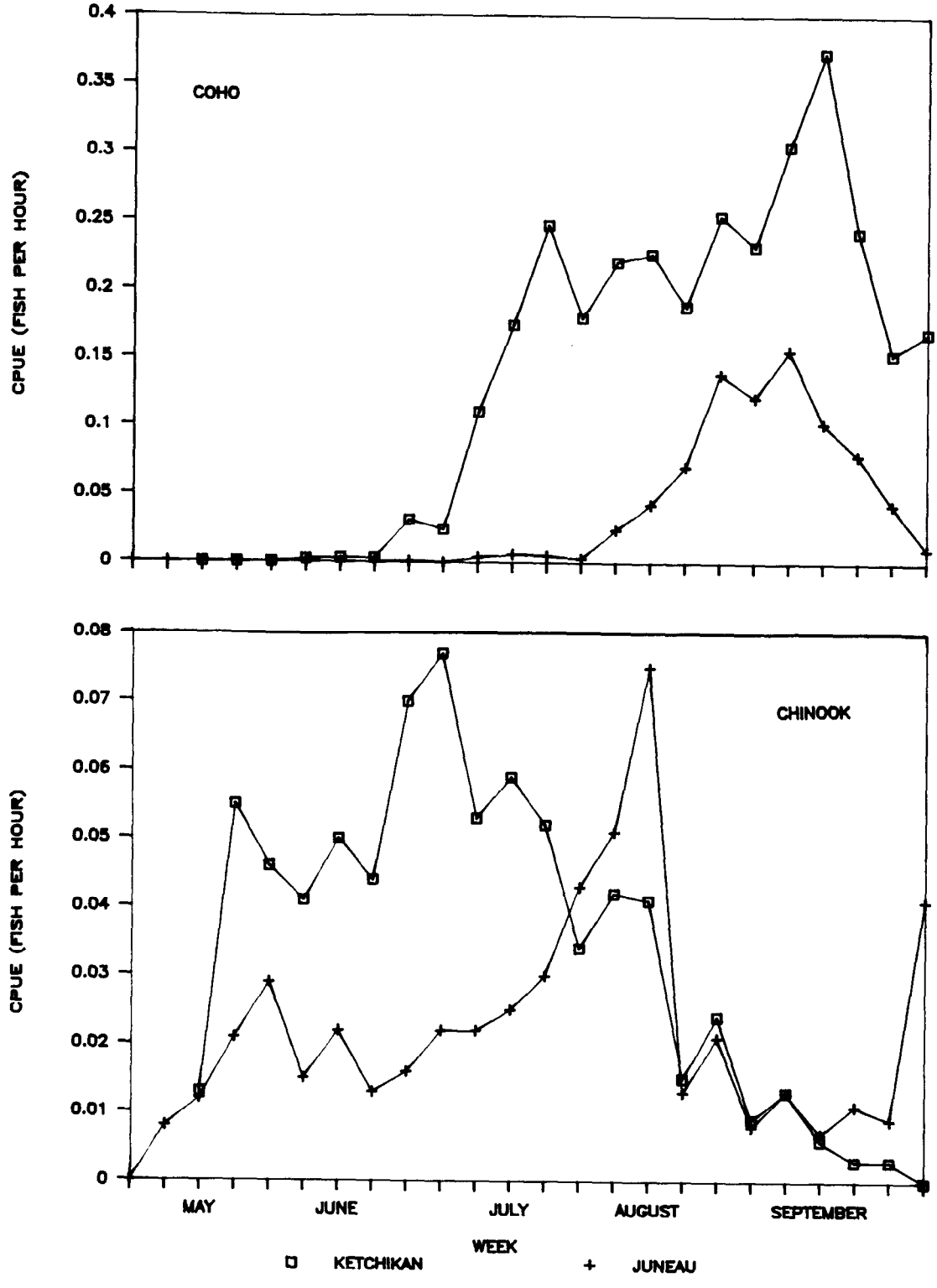

Figure 10. Comparison of chinook and coho salmon catch rates (fish per rod-hour of targeted effort) for the 1986 Juneau and Ketchikan marine sport fisheries.

Lakes and and the Sheep Creek SHA. In 1983, the last time that the entire Juneau roadside fishery was surveyed (Neimark 1984), an estimated 2,900 hours were expended at Twin Lakes resulting in a harvest of over 1,100 landlocked coho salmon. In contrast, less than 300 angler hours were expended at Twin Lakes during the period from 1 July to 30 September 1986, and no land-locked coho salmon were harvested by the few anglers that were sampled. The poor performance of the Twin Lakes fishery may have been influenced by vandalism at the flow control structure at the lake outlet which caused the loss of a large portion of the hatchery coho salmon present in the lake.

The level of harvest and effort observed at the Sheep Creek SHA was also low as less than 2,500 pink salmon were harvested during the survey period and less than 2,200 angler hours were expended compared to over 7,100 pink salmon taken in 1983 in 7,500 angler hours.

Compared to previous years, a relatively large number of cutthroat trout were caught at Fish Creek and lower Montana Creek access areas in 1986. Neimark (1984) estimated that no cutthroat were taken from either of these areas for the entire season in 1983, while in 1986, during the survey period, 170 and 130 cutthroat were harvested by anglers fishing at Fish Creek and Montana Creek, respectively.

Only forty-one anglers fishing for Dolly Varden were contacted by creel samplers at Montana Creek during the survey period. Of these anglers, 37 were aware that a "no-bait" special regulation existed for Montana Creek and 36 were in favor of the artificial lures only restriction. Only 9 out of the 41 anglers contacted knew the purpose of the regulation (i.e., conservation of Dolly Varden in Montana Creek).

Haines Roadside Sport Fisheries:

Total angler effort and harvest of coho salmon of the Chilkat River fishery in 1986 was 3,000 angler-hours and 200 coho, respectively, compared to 5,000 angler-hours and a harvest of over 700 coho salmon in 1985. Angling effort of the Chilkoot River fishery increased from 26,000 angler-hours in 1985 to 32,000 angler-hours in 1986. The estimated harvest of 700 coho salmon in the Chilkoot fishery in 1986 was similar to that observed in 1985.

Yakutat Roadside Sport Fisheries:

In 1986, over 25,000 angler-hours of effort were expended by anglers fishing for chinook and coho salmon and steelhead on the Situk River. Anglers hooked and landed 2,381 steelhead but harvested only 287. Very few chinook salmon were harvested by anglers fishing the Situk in 1986 primarily because of conservation closures needed to ensure adequate escapement. In 1986, 1,450 coho were taken at the Situk River, 1,330 at the Lost River, and 1,380 coho at the Ankau Lagoon system. This harvest (4,160) is much lower than that seen in 1985, when over 7,000 coho salmon were harvested from these rivers.

Petersburg Roadside Sport Fisheries:

Steelhead anglers fishing at Blind Slough (Crystal Creek), Ohmer Creek, and Falls Creek harvested 51, 99, and 89 steelhead respectively from 14 April to 1 June 1986. This harvest was lower than 1985 when 485 steelhead were taken at Falls Creek, 198 at Crystal Creek, and 141 at Ohmer Creek. The reduced steelhead harvest was expected because the number of steelhead released by the Crystal Lake Hatchery at these locations in 1983 was greatly reduced due to disease problems. As in 1985, approximately 60 percent of the steelhead harvested in these areas were of hatchery origin.

Chinook Age and Size Composition

The age composition of chinook salmon harvested in marine sport fisheries in southeast Alaska in 1986 varied considerably between the various fisheries (Table 35 and 36). For example, over 90 percent of chinook harvested in the Haines marine sport fishery in 1986 were age 1.3, 1.4, or 1.5. These chinook are primarily large, mature, spawners returning to tributaries of the Chilkat River near Haines. Similarly, over 80 percent and 60 percent of the chinook salmon caught by Wrangell and Petersburg marine anglers, respectively, were age 1.3, 1.4, or 1.5. Nearly all of the ocean age .4 and .5 and many of the age .3 fish are large, mature, spawners returning to tributaries of the Stikine River near Wrangell.

The percentage of mature chinook harvested in other marine sport fisheries in Southeast in 1986, was much lower than for Haines, Petersburg and Wrangell. For the Juneau marine fishery, including the Golden North Salmon Derby, 77 percent of sport caught chinook were age 1.2 or 1.3 and less than 10 percent were age 1.4 or 1.5. For the Ketchikan and Sitka fisheries, 7 percent and 17 percent of sport caught chinook were age 1.4 or 1.5, respectively.

Hatchery Contributions

In 1986, 24 percent (3,600) of the chinook and 17 percent (5,300) of the coho harvested were examined for missing adipose fins which indicated the presence of a micro-wire tag. (Table 37)

The estimated contributions of hatchery produced chinook and coho salmon to southeast Alaska marine sport fisheries during 1986 are summarized in Tables 38 through 45 and the estimated contributions of wild coded micro-wire tagged chinook and coho salmon in Tables 46 and 47. Hatchery contributions listed for the Juneau and Ketchikan fisheries (non-derby) may be biased as no attempt was made to account for differences in catch sampling fractions within early, middle, and late seasonal strata.

In recent years, the contribution of Alaska hatchery produced chinook salmon to Southeast sport fisheries has increased steadily. From 1983 to 1986, the hatchery contribution to Southeast sport fisheries has increased from 4 percent in 1983 to over 20 percent in 1986 while at the same time, the estimated harvest of wild stock chinook salmon has remained stable or even declined (Figure 11).

Table 35. Age composition of chinook salmon from selected southeast Alaska marine sport fisheries, 1986.

Fishery (Sampling Dates)			Brood Year and Age Class										
			1984	1983		1982		1981		1980		1979	
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	0.5	1.4	1.5	Total
Haines Derby and Creel 14 April-13 July	Males	Sample Number					1	2	15		49	3	70
		Percent					0.6	1.3	9.6		31.4	1.9	44.9
		Std. Error						0.6	1.7		2.6	0.8	
		Number Harvested					11	21	159		520	32	743
	Females	Sample Number				1		1	12		69	3	86
		Percent				0.6		0.6	7.7		44.2	1.9	55.1
		Std. Error							1.5		2.8	0.8	
		Number Harvested				11		11	127		732	32	912
	Total	Sample Number				2	6	4	67		229	10	318
		Percent				0.6	1.9	1.3	21.1		72.0	3.1	100.0
		Std. Error				0.4	0.8	0.6	2.3		2.5	1.0	
		Number Harvested				10	31	21	349		1,192	52	1,655
Juneau Derby 1-3 August	Males	Sample Number				1			1				2
		Percent				0.6			0.6				1.3
		Std. Error											
		Number Harvested				79			79				157
	Females	Sample Number					2		8		2		12
		Percent					1.3		5.1		1.3		7.7
		Std. Error					3.2		6.4		3.2		
		Number Harvested					157		629		157		943
	Total	Sample Number		3	1	64	168	7	315		23		581
		Percent		0.5	0.2	11.0	28.9	1.2	54.2		4.0		100.0
		Std. Error		0.3		1.3	1.9	0.5	2.1		0.8		
		Number Harvested		6	2	121	318	13	596		44		1,100

-continued-

Table 35. Age composition of chinook salmon from selected southeast Alaska marine sport fisheries, 1986.

Fishery (Sampling Dates)			Brood Year and Age Class										
			1984	1983		1982		1981		1980		1979	
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	0.5	1.4	1.5	Total
Juneau Creel	Males	Sample Number		1	1	2	11	2	23		3		43
14 April -		Percent		0.6	0.6	1.3	7.1	1.3	14.7		1.9		27.6
5 October		Std. Error				1.7	3.9	1.7	5.4		2.1		
		Number Harvested		38	38	75	414	75	865		113		1,618
	Females	Sample Number			1	4	15	4	21		17		62
		Percent			0.6	2.6	9.6	2.6	13.5		10.9		39.7
		Std. Error				2.0	3.7	2.0	4.3		4.0		
		Number Harvested			38	150	564	150	790		640		2,332
	Total	Sample Number		5	7	35	139	18	220		89	2	515
		Percent		1.0	1.4	6.8	27.0	3.5	42.7		17.3	0.4	100.0
		Std. Error		0.4	0.5	1.1	2.0	0.8	2.2		1.7	0.3	
		Number Harvested		38	54	268	1,066	138	1,687		683	15	3,950
Ketchikan	Males	Sample Number			2	10	34	4	22		5		77
Creel		Percent			1.3	6.4	21.8	2.6	14.1		3.2		49.4
28 April -		Std. Error			1.3	2.8	4.7	1.8	4.0		2.0		
28 September		Number Harvested			66	329	1,120	132	725		165		2,536
	Females	Sample Number		3	2	11	10	5	40		4		75
		Percent		4.0	1.3	7.1	6.4	3.2	25.6		2.6		48.1
		Std. Error		2.3	1.3	3.0	2.8	2.0	5.0		1.8		
		Number Harvested		99	66	362	329	165	1,317		132		2,470
	Total	Sample Number	2	33	28	124	233	47	269	3	59	3	801
		Percent	0.2	4.1	3.5	15.5	29.1	5.9	33.6	0.4	7.4	0.4	100.0
		Std. Error	0.2	0.7	0.6	1.3	1.6	0.8	1.7	0.2	0.9	0.2	
		Number Harvested	12	206	175	775	1,456	294	1,681	19	369	19	5,006

-continued-

Table 35. Age composition of chinook salmon from selected southeast Alaska marine sport fisheries, 1986.

Fishery (Sampling Dates)			Brood Year and Age Class										
			1984	1983		1982		1981		1980		1979	
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	0.5	1.4	1.5	Total
Wrangell	Males	Sample Number				1	6	5	11		18		41
Creel		Percent				0.6	3.8	3.2	7.1		11.5		26.3
14 April-6 July		Std. Error					3.0	2.8	4.0		5.0		
		Number Harvested				18	108	90	197		323		736
	Females	Sample Number				4	1	4	22		29		60
		Percent				2.6	0.6	2.6	14.1		18.6		38.5
		Std. Error				2.0		2.0	4.5		5.0		
		Number Harvested				72	18	72	395		520		1,076
	Total	Sample Number		1		7	9	9	58		65	3	152
		Percent		0.7		4.6	5.9	5.9	38.2		42.8	2.0	100.0
		Std. Error				1.7	1.9	1.9	3.9		4.0	1.1	
		Number Harvested		12		83	107	107	691		775	36	1,812
Petersburg	Males	Sample Number				3	2	4	9		13		31
Creel		Percent				1.9	1.3	2.6	5.8		8.3		19.9
14 April -		Std. Error				2.5	2.0	2.8	4.2		5.0		
29 June		Number Harvested				47	31	62	140		202		481
	Females	Sample Number				2		6	9		20	1	38
		Percent				1.3		3.8	5.8		12.8	0.6	24.4
		Std. Error				1.8		3.1	3.8		5.4		
		Number Harvested				31		93	140		310	16	589
	Total	Sample Number				17	2	20	30		47	3	119
		Percent				14.3	1.7	16.8	25.2		39.5	2.5	100.0
		Std. Error				3.2	1.2	3.4	4.0		4.5	1.4	
		Number Harvested				153	18	180	270		423	27	1,070
Sitka	Total	Sample Number				60	3	54	27		26		170
Creel		Percent				38.5	1.9	34.6	17.3		16.7		109.0
14 April -		Std. Error				3.7	1.1	3.6	2.9		2.9		
29 June		Number Harvested				296	15	266	133		128		769

Table 36. Length composition of chinook salmon from selected southeast Alaska marine sport fisheries, 1986.

Fishery (Sampling Dates)			Brood Year and Age Class										
			1984	1983		1982		1981		1980		1979	
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	0.5	1.4	1.5	Total
Haines Derby and Creel 14 April-13 July	Males	Avg. Length					69.4	111.4	87.0		99.7	104.5	
		Std. Error						3.0	2.9		1.0	4.2	
		Sample Size					1	2	15		49	3	70
	Females	Avg. Length				67.8		85.8	81.0		95.3	102.3	
		Std. Error							1.7		0.6	4.3	
		Sample Size				1		1	12		69	3	86
	Total	Avg. Length				79.0	65.7	101.9	83.3		96.5	101.8	
		Std. Error				11.3	2.1	6.2	1.0		0.4	2.6	
		Sample Size				2	6	4	67		228	10	317
Juneau Derby 1-3 August	Males	Avg. Length				69.5			81.0				
		Std. Error											
		Sample Size				1			1				2
	Females	Avg. Length					73.0		83.5		92.0		
		Std. Error					4.0		1.2		1.0		
		Sample Size					2		8		2		12
	Total	Avg. Length		67.3	46.0	77.1	71.4	88.4	80.7		85.9		
		Std. Error		6.0		0.6	0.4	1.6	0.3		1.5		
		Sample Size		3	1	64	167	7	313		23		555
Juneau Creel 14 April - 5 October	Males	Avg. Length		76.0	56.0	73.9	67.8	93.8	78.0		101.3		
		Std. Error				3.1	2.1	3.8	1.4		2.9		
		Sample Size		1	1	2	11	2	23		3		43
	Females	Avg. Length			48.0	74.2	69.2	83.8	79.0		94.5		
		Std. Error				2.2	1.6	2.5	1.1		1.0		
		Sample Size			1	4	15	4	21		17		62
	Total	Avg. Length		72.9	53.0	76.8	69.1	86.7	78.5		93.2	102.5	
		Std. Error		1.5	4.1	1.1	0.5	1.7	0.4		0.9	0.5	
		Sample Size		5	7	35	139	18	220		89	2	515

-continued-

Table 36. Length composition of chinook salmon from selected southeast Alaska marine sport fisheries, 1986.

Fishery (Sampling Dates)			Brood Year and Age Class										
			1984	1983		1982		1981		1980		1979	
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	0.5	1.4	1.5	Total
Ketchikan Creel 28 April - 28 September	Males	Avg. Length			53.5	82.5	73.4	101.6	88.0		106.8		
		Std. Error			1.5	2.8	0.8	4.3	1.8		4.7		
		Sample Size			2	10	34	4	22		5		77
	Females	Avg. Length		54.8	46.0	83.1	70.7	100.3	86.1		102.7		
		Std. Error		6.1	0.5	2.1	2.0	1.7	1.2		6.6		
		Sample Size		3	2	11	10	5	40		4		75
	Total	Avg. Length	41.5	65.7	49.1	83.3	73.6	96.4	86.5	90.0	101.2	99.3	
		Std. Error	4.5	1.5	1.4	0.8	0.3	1.3	0.5	2.1	1.0	1.8	
		Sample Size	2	33	28	124	233	47	269	3	59	3	801
Wrangell Creel 14 April-6 July	Males	Avg. Length				91.0	74.0	105.4	87.1		97.7		
		Std. Error					1.5	3.0	2.0		2.5		
		Sample Size				1	6	5	11		10		33
	Females	Avg. Length				91.8	76.0	91.5	87.2		94.8		
		Std. Error				4.1		4.9	1.4		1.3		
		Sample Size				4	1	4	22		29		60
	Total	Avg. Length		76.5		90.0	73.3	99.2	86.8		94.8	107.0	
		Std. Error				3.7	1.2	3.5	1.0		1.2	6.7	
		Sample Size		1		7	9	9	58		65	3	152
Petersburg Creel 14 April - 29 June	Males	Avg. Length				81.0	74.3	99.1	88.9		95.4		
		Std. Error				3.1	7.3	3.9	2.0		2.1		
		Sample Size				3	2	4	9		13		31
	Females	Avg. Length				80.0		89.8	87.9		94.5	105.0	
		Std. Error				5.0		2.3	1.5		1.4		
		Sample Size				2		6	9		20	1	38
	Total	Avg. Length				77.2	74.3	93.1	86.8		94.5		
		Std. Error				1.3	7.3	1.7	1.1		1.0		
		Sample Size				17	2	20	30		47		116
Sitka Creel 14 April - 29 June	Total	Avg. Length				79.5	72.2	98.3	84.2		95.2		
		Std. Error				1.0	1.2	1.1	1.4		1.9		
		Sample Size				60	3	54	27		26		170

Table 37. Numbers of chinook and coho salmon examined for coded micro-wire tags in southeast Alaska marine sport fisheries in 1986.

Fishery	CHINOOK Estimated Harvest	CHINOOK Number Sampled	CHINOOK %	COHO Estimated Harvest	COHO Number Sampled	COHO %
Juneau Non-Derby	3,931	782	20	9,396	1,821	19
Juneau Derby	1,119	874	78	367	271	74
Ketchikan [1/]	5,006	1,020	20	20,814	3,255	16
Petersburg [2/]	1,070	150	14	-	-	
Wrangell	1,812	222	12	-	-	
Haines	1,655	227	14	-	-	
Sitka Non-Derby	442	25	6	-	-	
Sitka Derby	327	327	100	-	-	
Totals	15,362	3,627	24	30,577	5,347	17

1 Excludes Thomas Basin SHA

2 Excludes Blind Slough SHA

Table 38. Estimated contributions of hatchery produced chinook salmon to the Juneau marine sport harvest (excluding Derby) from 14 April to 5 October 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	EXPANDED CONTRIBUTIONS
British Columbia	CDFO	Kitimat River	022745	1	5
			TOTAL	1	5
		Quinsam River	022304	2	52
			082062	1	5
			082107	1	5
			082145	1	5
			TOTAL	5	67
	British Columbia		TOTAL	6	72
Southeast Alaska	NMFS	Little Port Walter	031762	4	20
			031763	1	5
			031801	1	5
			031802	1	5
			031804	2	10
			031808	1	5
			031809	2	10
			031810	2	10
			031811	4	20
			031812	5	25
			031813	2	10
			031816	1	5
			031818	2	10
			031843	1	5
			036303	1	5
			036304	1	5
			036306	1	5
			036308	3	15
			036309	1	5
			TOTAL	36	180

-Continued-

Table 38. Estimated contributions of hatchery produced chinook salmon to the Juneau marine sport harvest (excluding Derby) from 14 April to 5 October 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	EXPANDED CONTRIBUTIONS
	ADF&G	Crystal Lake	042205	1	5
			042229	8	96
			042353	3	15
			042354	3	33
			042356	3	76
			TOTAL	18	225
	ADF&G	Deer Mountain	042223	1	26
			TOTAL	1	26
	ADF&G	Hidden Falls	042335	3	17
			042336	3	15
			042337	1	5
			046063	2	10
			TOTAL	9	47
	ADF&G	Snettisham	042228	4	111
			042350	2	10
			042363	4	20
			TOTAL	10	141
	SSRAA	Whitman Lake	042255	3	41
			042430	1	5
			042431	1	18
			B40907	1	5
			TOTAL	6	69
	Southeast Alaska		TOTAL	80	688
TOTAL ALL REGIONS				86	760

Table 39. Estimated contributions of hatchery produced chinook to the 1986 Juneau Golden North Salmon Derby harvest, 1, 2, and 3 August.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	EXPANDED CONTRIBUTIONS
Washington	WDF	Nemah River	632507	1	1
			TOTAL	1	1
		Priest Rapids	632611	1	35
			TOTAL	1	35
	Washington		TOTAL	2	36
British Columbia	CDFO	Kitimat River	022436	1	1
			022527	1	1
			022745	1	1
			TOTAL	3	3
	CDFR	Quinsam River	082121	1	1
			082127	1	1
			082148	1	1
			TOTAL	3	3
	British Columbia		TOTAL	6	6
Southeast Alaska	NMFS	Little Port Walter	031762	4	7
			031763	1	1
			031803	1	1
			031804	3	3
			031807	1	1
			031808	4	4
			031809	2	2
			031810	5	8
			031811	7	12

-Continued-

Table 39. Estimated contributions of hatchery produced chinook to the 1986 Juneau Golden North Salmon Derby harvest, 1, 2, and 3 August.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	EXPANDED CONTRIBUTIONS
Southeast Alaska (Continued)	NMFS (Continued)		031812	4	10
			031813	4	7
			031814	4	7
			031815	1	1
			031829	2	7
			031853	1	4
			036303	4	4
			036306	2	5
			036307	1	1
			036308	1	1
			TOTAL	52	86
	ADF&G	Crystal Lake	042202	1	5
			042229	18	56
			042353	1	1
			042354	3	7
			042355	2	2
			042356	2	2
			TOTAL	27	73
		Hidden Falls	042335	1	1
			042336	2	5
			TOTAL	3	6
		Snettisham	040263	1	4
			042228	6	28
			042350	6	11
			042363	4	9
			TOTAL	17	52
	SSRAA	Whitman Lake	042255	2	7
			042430	1	4

-Continued-

Table 39. Estimated contributions of hatchery produced chinook to the 1986 Juneau Golden North Salmon Derby harvest, 1, 2, and 3 August.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	EXPANDED CONTRIBUTIONS
			044063	1	1
			B40907	1	1
			TOTAL	5	13
	Southeast Alaska		TOTAL	104	230
TOTAL ALL REGION				112	272

Table 40. Estimated contributions of hatchery produced coho salmon to the Juneau marine sport harvest from 15 April to 5 October 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Southeast Alaska	NMFS	Auke Creek	031841	2	6
			031842	1	3
			TOTAL	3	9
	ADF&G	Snettisham	040317	9	28
			TOTAL	9	28
	Southeast Alaska		TOTAL	12	37
TOTAL ALL REGION			TOTAL	12	37

Table 41. Estimated contributions of hatchery produced chinook salmon to the Ketchikan marine sport harvest from 28 April to 28 September 1986.[1]

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Oregon	ANAD	Anadromous Inc.	621760	1	98
			TOTAL	1	98
	ODFW	Bonneville	072828	1	5
			073007	1	10
			073008	1	5
			073124	1	5
			073125	1	5
			TOTAL	5	30
	OAF	Oregon Aqua-Foods	603657	1	5
			TOTAL	1	5
	Oregon		TOTAL	7	133
Washington	WDF	Nemah	632361	1	5
			TOTAL	1	5
		Rocky Reach	632857	3	14
			TOTAL	3	14
		Washougal	633116	1	5
			TOTAL	1	5
		Willapa	633121	1	5
			TOTAL	1	5
	Washington		TOTAL	6	29

-Continued-

Table 41. Estimated contributions of hatchery produced chinook salmon to the Ketchikan marine sport harvest from 28 April to 28 September 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
British Columbia	CDFO	Kitimat River	022527	1	5
			022744	1	11
			022745	1	5
			023253	2	152
			TOTAL	5	173
		Puntledge River	022556	1	5
			TOTAL	1	5
		Quinsam River	022304	1	25
			022518	1	40
			022632	3	126
			TOTAL	5	191
	CDFR	Quinsam River	082047	1	5
			082050	1	5
			082056	1	5
			082105	1	5
			082111	1	5
			082132	1	5
			082137	1	5
			082149	1	5
			082361	1	5
			TOTAL	9	45
	CDFO	Snootli Creek	022755	1	5
			TOTAL	1	5
		Tenderfoot Creek	022636	1	7
			TOTAL	1	7
	British Columbia		TOTAL	22	426

-Continued-

Table 41. Estimated contributions of hatchery produced chinook salmon to the Ketchikan marine sport harvest from 28 April to 28 September 1986.[1]

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Southeast Alaska	ADF&G	Deer Mountain	042121	4	21
			042222	1	5
			042223	6	145
			042230	1	5
			TOTAL	12	176
	MIC	Little Port Walter	471625	2	10
			TOTAL	2	10
		Tamgas Creek	471628	6	29
			TOTAL	6	29
	SSRAA	Neets Bay	040321	3	30
			TOTAL	3	30
		Whitman Lake	042255	32	526
			042430	10	166
			042431	15	248
			042463	16	77
			042503	5	46
			044005	11	58
			044063	1	5
			B40708	1	5
			B40907	42	204
			B40908	12	58
			TOTAL	145	1,393
	Southeast Alaska		TOTAL	168	1,638
TOTAL ALL REGION				203	2,226

[1] Does not include 202 chinook salmon produced by Deer Mountain Hatchery harvested at the Thomas Basin Special Harvest Area.

Table 42. Estimated contribution of hatchery produced coho salmon to the Ketchikan marine sport harvest from 28 April through 28 September 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
British Columbia	CDFO	Kispiox River	022444	1	9
			TOTAL	1	9
	British Columbia		TOTAL	1	9
Southeast Alaska	SSRAA	Neets Bay	040319	3	808
			040320	2	868
			042432	3	810
			TOTAL	8	2,486
		Whitman Lake	042506	2	131
			042507	3	287
			042509	3	287
			TOTAL	8	705
	Southeast Alaska		TOTAL	16	3,191
TOTAL ALL REGIONS				17	3,200

Table 43. Estimated contribution of hatchery produced chinook salmon to the Petersburg marine sport harvest from 14 April to 29 June 1986.[1]

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Oregon	ODFW	Bonneville	072827	1	7
			TOTAL	1	7
	Oregon		TOTAL	1	7
British Columbia	CDFR	Quinsam River	082123	1	7
			082128	1	7
			TOTAL	2	14
	CDFO	Tenderfoot Creek	022517	1	8
			TOTAL	1	8
	British Columbia		TOTAL	3	22
Southeast Alaska	ADF&G	Crystal Lake	042202	4	133
			042205	1	7
			042229	4	65
			TOTAL	9	205
	NMFS	Little Port Walter	031802	1	7
			031804	1	7
			031811	2	14
			031813	1	7
			TOTAL	5	35
	SSRAA	Whitman Lake	B40907	1	7
			B40907	2	14
			TOTAL	3	21

-Continued-

Table 43. Estimated contribution of hatchery produced chinook salmon to the Petersburg marine sport harvest from 14 April to 29 June 1986.[1]

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
	Southeast Alaska		TOTAL	17	261
TOTAL ALL REGION				21	290

[1] Does not include 556 chinook salmon produced by Crystal Lake Hatchery harvested at Blind Slough Special Harvest Area.

Table 44. Estimated contribution of hatchery produced chinook salmon to the Wrangell marine sport harvest from 14 April to 6 July 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
British Columbia	CDFR	Quinsam River	082104	1	8
			082112	1	8
			TOTAL	2	16
	British Columbia		TOTAL	2	16
Southeast Alaska	MIC	Tamgas Creek	471628	1	8
			TOTAL	1	8
	SSRAA	Whitman Lake	042255	3	84
			042230	2	56
			B40907	2	16
			B40908	1	8
			TOTAL	8	164
	Southeast Alaska		TOTAL	9	172
TOTAL ALL REGION				11	188

Table 45. Estimated contribution of hatchery produced chinook salmon to the Sitka marine sport harvest (includes the Sitka King Salmon Derby) from 14 April to 29 June 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Oregon	ODFW	Bonneville	072828	1	1
			TOTAL	1	1
	Oregon		TOTAL	1	1
Washington	WDF	Priest Rapids	632612	1	1
			TOTAL	1	1
	Washington		TOTAL	1	1
British Columbia	CDFO	Conuma River	022203	2	5
			TOTAL	2	5
		Kitimat River	022204	1	1
			TOTAL	1	6
		San Juan River	022453	1	3
			TOTAL	1	3
	CDFR	Quinsam River	022304	2	10
			082054	1	1
			082126	1	1
			TOTAL	4	12
		Robertson Creek	082223	1	1
			TOTAL	1	1
	British Columbia		TOTAL	9	27

-Continued-

Table 45. Estimated contribution of hatchery produced chinook salmon to the Sitka marine sport harvest (includes the Sitka King Salmon Derby) from 14 April to 29 June 1986.

REGION	AGENCY	HATCHERY	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Southeast	ADF&G	Crystal Lake	042202	1	5
			TOTAL	1	5
	NMFS	Little Port Walter	031763	1	1
			031803	1	1
			TOTAL	2	2
	NSRA	Medvejie CIF	042246	1	1
			TOTAL	1	1
	Southeast Alaska		TOTAL	4	8
TOTAL ALL REGION				15	37

Table 46. Estimated contribution of wild, coded micro-wire tagged chinook salmon to the harvest of Southeast marine sport fisheries during 1986 (recoveries are expanded only by the fraction of chinook sampled for adipose clips in the respective fisheries).

FISHERY	AGENCY	STOCK	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Juneau	ADF&G	Stikine River	042114	1	5
		Taku River	041920	1	5
		Unuk River	042058	1	5
			TOTAL	3	15
Ketchikan	ADF&G	Chickamin River	042062	2	10
		Unuk River	042057	1	5
			042058	1	5
			042158	1	5
			TOTAL	5	25
		Southeast Alaska	TOTAL	8	40

Table 47. Estimated contribution of wild coded-microwire tagged coho salmon to the harvest of Southeast marine sport fisheries during 1986 (recoveries are expanded only by the fraction of coho sampled for adipose clips in the respective fisheries).

FISHERY	AGENCY	STOCK	TAG CODE	RECOVERIES	ESTIMATED CONTRIBUTIONS
Juneau	NMFS	Auke Creek	031840	7	36
			TOTAL	7	36
	ADF&G	Berners River	042436	3	11
			TOTAL	3	11
		Chilkat River	042418	1	5
			042419	1	5
			TOTAL	2	10
		Speel Lake	042329	1	5
			042433	1	5
			TOTAL	2	10
Ketchikan	ADF&G	Hugh Smith	042451	1	6
				1	6
	Southeast Alaska		TOTAL	15	73

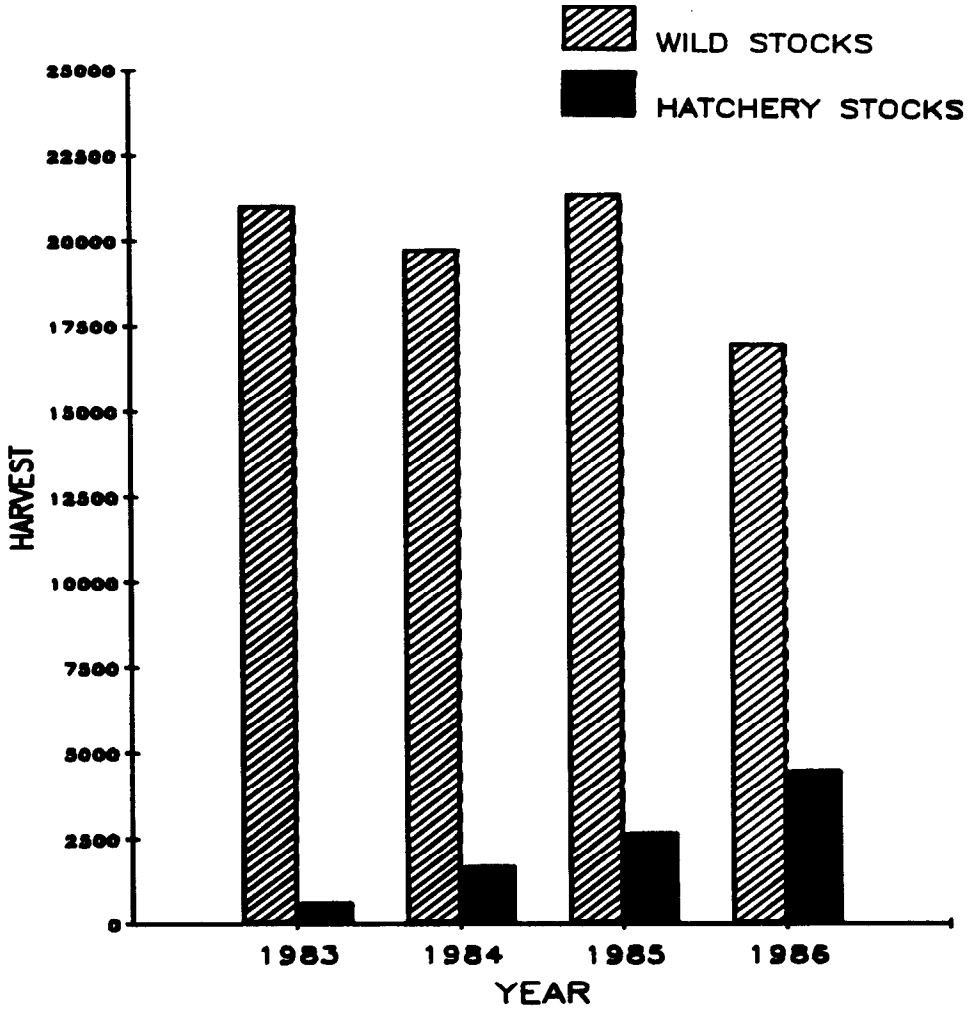

Figure 11. Harvests of wild and hatchery stock chinook salmon in southeast Alaska marine sport fisheries from 1983 to 1986 (total harvest figures from Statewide Postal Harvest Survey, Mills 1987).

The majority of hatchery produced chinook salmon harvested by Southeast marine fisheries in 1986 were taken in Ketchikan and Juneau. (Figure 12). Large numbers of hatchery origin chinook were also harvested by Petersburg area marine anglers. Forty-four percent of the chinook salmon harvested in the Ketchikan marine sport fishery in 1986 were produced by hatcheries. The majority of hatchery chinook harvested in Ketchikan were originally released from the Whitman Lake (SSRAA), Neets Bay (SSRAA), and Deer Mountain (ADF&G) hatcheries, all located close to Ketchikan. In the Juneau marine fishery, 20 percent of the harvested chinook were of hatchery origin, with the majority produced by the Crystal Lake (ADF&G), Little Port Walter (NMFS), and Snettisham (ADF&G) hatcheries. A considerable number of hatchery chinook were also harvested by shore anglers fishing at the Blind Slough (550) and Thomas Basin (200) SHA's.

Marine creel surveys in all locations except Juneau and Ketchikan ended during the first or second weeks of July prior to the time when coho salmon are available to sport anglers. Therefore, only the observed contributions of hatchery coho salmon to these fisheries are listed in this report. In the Ketchikan marine fishery in 1986, 3,200 coho salmon originating primarily from the Whitman Lake and Neets Bay facilities, were caught by sport anglers. Very few hatchery origin coho salmon were taken by Juneau area marine anglers during the survey period.

Seasonal Use and Relative Efficiency of Sport Gear

Catch rates for both chartered and non-chartered anglers using different sport fishing gear and methods in the Juneau, Ketchikan, Petersburg, Wrangell, Haines and Sitka marine sport fisheries during 1986 are summarized in Tables 48 through 61.

The gear use percentages and catch rates for the Juneau and Ketchikan fisheries, as calculated, are likely biased as no attempt was made to account for differences in the amount of sampling effort expended in each seasonal period stratum in each respective fishery. However, because the magnitude of this bias was considered to be small and because of time constraints and sample size considerations, we felt that further analysis of this data was unwarranted.

Juneau area marine anglers trolling for salmon used conventional tackle 83 percent of the time. Twelve percent of anglers used downriggers while diving devices were used 4 percent of the time. Ketchikan anglers followed a similar pattern using conventional tackle 87 percent, downriggers 11 percent, and diving devices, 1 percent of the time.

There were no differences observed in the seasonal catch efficiency of downriggers compared to other types of sport gear. In addition, the percentage of anglers using conventional sport gear, downriggers, and diving devices remained fairly constant throughout the fishing season for both the Juneau and Ketchikan fisheries. Essentially, for those anglers choosing to troll for salmon, downriggers were more effective than other gear types throughout the entire fishing season.

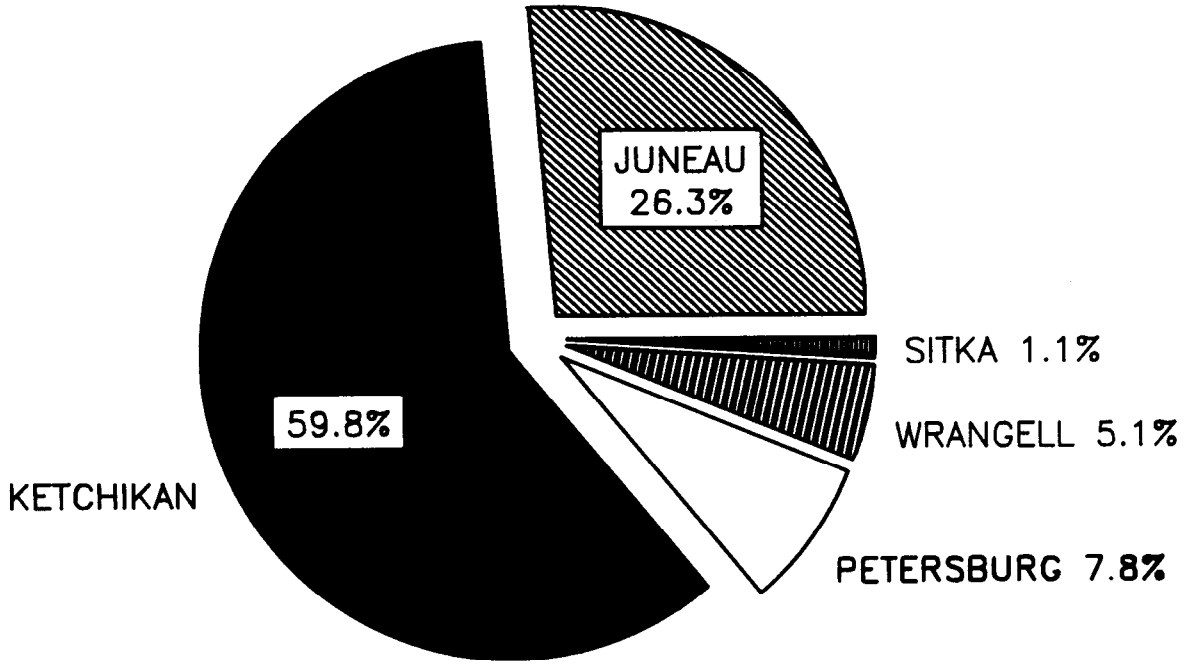

Figure 12. Harvest, by fishery, of 3,700 hatchery produced chinook salmon in 1986 (does not include harvest of hatchery chinook at Blind Slough (550) and Thomas Basin (200) Special Harvest Areas).

Table 48. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Juneau marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	27586	80.9	409	471	880	0.015	0.017	0.032
	Downriggers	3276	9.6	145	176	321	0.044	0.054	0.098
	Diving Devices	1503	4.4	37	46	83	0.025	0.031	0.055
	Total	32365	94.9	591	693	1284	0.018	0.021	0.040
Charter	Conventional	827	2.4	14	26	40	0.017	0.031	0.048
	Downriggers	919	2.7	62	57	119	0.068	0.062	0.130
	Diving Devices	6	.0	0	0	0	0.000	0.000	0.000
	Total	1752	5.1	76	83	159	0.043	0.047	0.091
TOTAL	Conventional	28413	83.3	423	497	920	0.015	0.017	0.032
	Downriggers	4194	12.3	207	233	440	0.049	0.056	0.105
	Diving Devices	1510	4.4	37	46	83	0.025	0.030	0.055
	Total	34117	100.0	667	776	1443	0.020	0.023	0.042

Table 49. Sampled catch and catch rates by gear type and month of non-chartered anglers trolling for salmon in the Juneau marine sport fishery, 1986.

Geartype	Month	Rod Hours	Chinook Caught >28"	Chinook Caught <28"	Chinook Caught All	Chinook Catch / Rod Hour >28"	Chinook Catch / Rod Hour <28"	Chinook Catch / Rod Hour Combined
Conventional	April-May	4408	85	9	94	0.019	0.002	0.021
	June	4522	48	48	96	0.011	0.011	0.021
	July	5817	185	235	420	0.032	0.040	0.072
	August	8798	71	142	213	0.008	0.016	0.024
	Sept.-Oct	4040	20	37	57	0.005	0.009	0.014
Downriggers	April-May	643	15	2	17	0.023	0.003	0.026
	June	682	20	27	47	0.029	0.040	0.069
	July	725	66	85	151	0.091	0.117	0.208
	August	908	29	55	84	0.032	0.061	0.092
	Sept.-Oct	317	15	7	22	0.047	0.022	0.069
Diving Devices	April-May	174	6	2	8	0.035	0.012	0.046
	June	207	3	1	4	0.015	0.005	0.019
	July	452	16	33	49	0.035	0.073	0.108
	August	399	10	6	16	0.025	0.015	0.040
	Sept.-Oct	273	2	4	6	0.007	0.015	0.022

Table 50. Sampled catch and catch rates by type of angler, target, and method in the Juneau marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	32425	57.1	592	695	281	0.018	0.021	0.009
		Drifting	1431	2.5	32	37	53	0.022	0.026	0.037
		Anchored	1801	3.2	51	83	106	0.028	0.046	0.059
		Total	35657	62.8	675	815	440	0.019	0.023	0.012
	Bottomfish	Trolling	587	1.0	1	0	76	0.002	0.000	0.130
		Drifting	6589	11.6	7	14	1313	0.001	0.002	0.199
		Anchored	11496	20.2	13	21	2675	0.001	0.002	0.233
		Total	18673	32.9	21	35	4064	0.001	0.002	0.218
	Total	All	54329	95.6	696	850	4504	0.013	0.016	0.083
Charter	Salmon	Trolling	1752	3.1	76	83	7	0.043	0.047	0.004
		Drifting	79	0.1	2	7	0	0.025	0.089	0.000
		Anchored	197	0.3	28	25	1	0.142	0.127	0.005
		Total	2027	3.6	106	115	8	0.052	0.057	0.004
	Bottomfish	Trolling	18	.0	0	0	13	0.000	0.000	0.722
		Drifting	173	0.3	0	0	22	0.000	0.000	0.127
		Anchored	254	0.4	0	1	107	0.000	0.004	0.422
		Total	445	0.8	0	1	142	0.000	0.002	0.319
	Total	All	2471	4.4	106	116	150	0.043	0.047	0.061
TOTAL	All	All	56801	100.0	802	966	4654	0.014	0.017	0.082

Table 51. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Ketchikan marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	24447	78.0	746	2621	3367	0.031	0.107	0.138
	Downriggers	3086	9.8	245	842	1087	0.079	0.273	0.352
	Diving Devices	406	1.3	12	37	49	0.030	0.091	0.121
	Total	27939	89.2	1003	3500	4503	0.036	0.125	0.161
Charter	Conventional	2949	9.4	109	428	537	0.037	0.145	0.182
	Downriggers	444	1.4	17	231	248	0.038	0.521	0.559
	Diving Devices	0	0.0	0	0	0	-	-	-
	Total	3392	10.8	126	659	785	0.037	0.194	0.231
TOTAL	Conventional	27396	87.4	855	3049	3904	0.031	0.111	0.143
	Downriggers	3529	11.3	262	1073	1335	0.074	0.304	0.378
	Diving Devices	406	1.3	12	37	49	0.030	0.091	0.121
	Total	31332	100.0	1129	4159	5288	0.036	0.133	0.169

Table 52. Sampled catch and catch rates by gear type and month of all anglers (includes charters) trolling for salmon in the Ketchikan marine sport fishery, 1986.

Geartype	Month	Rod Hours	Chinook Caught >28"	Chinook Caught <28"	Chinook Caught All	Chinook Catch / Rod Hour >28"	Chinook Catch / Rod Hour <28"	Chinook Catch / Rod Hour Combined
Conventional	April-May	5861	220	347	567	0.038	0.059	0.097
	June	8196	400	1044	1444	0.049	0.127	0.176
	July	3632	140	428	568	0.039	0.118	0.156
	August	5741	91	555	646	0.016	0.097	0.113
	Sept.-Oct	3966	4	675	679	0.001	0.170	0.171
Downriggers	April-May	930	62	198	260	0.067	0.213	0.280
	June	1640	154	605	759	0.094	0.369	0.463
	July	399	38	113	151	0.095	0.283	0.379
	August	384	6	113	119	0.016	0.295	0.310
	Sept.-Oct	177	2	44	46	0.011	0.249	0.260
Diving Devices	April-May	85	4	5	9	0.047	0.059	0.106
	June	92	5	5	10	0.054	0.054	0.108
	July	31	3	4	7	0.097	0.130	0.227
	August	115	0	18	18	0.000	0.156	0.156
	Sept.-Oct	83	0	5	5	0.000	0.060	0.060

Table 53. Sampled catch and catch rates by type of angler, target, and method in the Ketchikan marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	27939	66.5	1003	3500	109	0.036	0.125	0.004
		Drifting	139	0.3	3	25	22	0.022	0.180	0.158
		Anchored	0	0.0	0	0	0	--	--	--
		Total	28078	66.9	1006	3525	131	0.036	0.126	0.005
	Bottomfish	Trolling	167	0.4	2	9	12	0.012	0.054	0.072
		Drifting	9210	21.9	29	20	1558	0.003	0.002	0.169
		Anchored	64	0.2	0	0	1	0.000	0.000	0.016
		Total	9441	22.5	31	29	1571	0.003	0.003	0.166
	Total	All	37519	89.3	1037	3554	1702	0.028	0.095	0.045
Charter	Salmon	Trolling	3392	8.1	126	659	17	0.037	0.194	0.005
		Drifting	33	0.1	0	2	3	0.000	0.061	0.091
		Anchored	0	0.0	0	0	0	--	--	--
		Total	3425	8.2	126	661	20	0.037	0.193	0.006
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	1049	2.5	1	0	298	0.001	0.000	0.284
		Anchored	0	0.0	0	0	0	--	--	--
		Total	1049	2.5	1	0	298	0.001	0.000	0.284
	Total	All	4474	10.7	127	661	318	0.028	0.148	0.071
TOTAL	All	All	41993	100.0	1164	4215	2020	0.028	0.100	0.048

Table 54. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Petersburg marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	2800	77.1	123	16	139	0.044	0.006	0.050
	Downriggers	340	9.4	25	5	30	0.074	0.015	0.088
	Diving Devices	480	13.2	25	1	26	0.052	0.002	0.054
	Total	3619	99.6	173	22	195	0.048	0.006	0.054
Charter	Conventional	0	0.0	0	0	0	--	--	--
	Downriggers	0	0.0	0	0	0	--	--	--
	Diving Devices	14	0.4	0	1	1	0.000	0.071	0.071
	Total	14	0.4	0	1	1	0.000	0.071	0.071
TOTAL	Conventional	2800	77.1	123	16	139	0.044	0.006	0.050
	Downriggers	340	9.4	25	5	30	0.074	0.015	0.088
	Diving Devices	494	13.6	25	2	27	0.051	0.004	0.055
	Total	3633	100.0	173	23	196	0.048	0.006	0.054

Table 55. Sampled catch and catch rates by type of angler, target, and method in the Petersburg marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	3619	82.6	173	22	26	0.048	0.006	0.007
		Drifting	37	0.8	1	1	2	0.027	0.027	0.055
		Anchored	47	1.1	5	0	2	0.106	0.000	0.042
		Total	3703	84.5	179	23	30	0.048	0.006	0.008
	Bottomfish	Trolling	18	0.4	0	0	1	0.000	0.000	0.056
		Drifting	479	10.9	2	0	94	0.004	0.000	0.196
		Anchored	171	3.9	0	0	61	0.000	0.000	0.358
		Total	667	15.2	2	0	156	0.003	0.000	0.234
	Total	All	4370	99.7	181	23	186	0.041	0.005	0.043
Charter	Salmon	Trolling	14	0.3	0	1	0	0.000	0.071	0.000
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	0	0.0	0	0	0	--	--	--
		Total	14	0.3	0	1	0	0.000	0.071	0.000
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	0	0.0	0	0	0	--	--	--
		Total	0	0.0	0	0	0	--	--	--
	Total	All	14	0.3	0	1	0	0.000	0.071	0.000
TOTAL	All	All	4384	100.0	181	24	186	0.041	0.005	0.042

Table 56. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Wrangell marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	5396	91.2	225	58	283	0.042	0.011	0.052
	Downriggers	110	1.9	13	2	15	0.118	0.018	0.136
	Diving Devices	72	1.2	5	14	19	0.069	0.194	0.263
	Total	5579	94.3	243	74	317	0.044	0.013	0.057
Charter	Conventional	188	3.2	18	1	19	0.096	0.005	0.101
	Downriggers	48	0.8	0	0	0	0.000	0.000	0.000
	Diving Devices	100	1.7	3	3	6	0.030	0.030	0.060
	Total	336	5.7	21	4	25	0.063	0.012	0.074
TOTAL	Conventional	5585	94.4	243	59	302	0.044	0.011	0.054
	Downriggers	158	2.7	13	2	15	0.082	0.013	0.095
	Diving Devices	172	2.9	8	17	25	0.047	0.099	0.146
	Total	5915	100.0	264	78	342	0.045	0.013	0.058

Table 57. Sampled catch and catch rates by type of angler, target, and method in the Wrangell marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	5579	78.3	243	74	17	0.044	0.013	0.003
		Drifting	109	1.5	2	0	2	0.018	0.000	0.018
		Anchored	482	6.8	14	1	5	0.029	0.002	0.010
		Total	6170	86.6	259	75	24	0.042	0.012	0.004
	Bottomfish	Trolling	5	0.1	0	0	0	0.000	0.000	0.000
		Drifting	91	1.3	1	2	5	0.011	0.022	0.055
		Anchored	480	6.7	1	0	58	0.002	0.000	0.121
		Total	575	8.1	2	2	63	0.003	0.003	0.110
	Total	All	6745	94.7	261	77	87	0.039	0.011	0.013
Charter	Salmon	Trolling	336	4.7	21	3	0	0.063	0.009	0.000
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	0	0.0	0	0	0	--	--	--
		Total	336	4.7	21	3	0	0.063	0.009	0.000
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	45	0.6	0	0	2	0.000	0.000	0.044
		Total	45	0.6	0	0	2	0.000	0.000	0.044
	Total	All	381	5.3	21	3	2	0.055	0.008	0.005
TOTAL	All	All	7126	100.0	282	80	89	0.040	0.011	0.012

Table 58. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Haines marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	1996	35.7	75	12	87	0.038	0.006	0.044
	Downriggers	464	8.3	26	16	42	0.056	0.035	0.091
	Diving Devices	2745	49.0	152	15	167	0.055	0.005	0.061
	Total	5204	93.0	253	43	296	0.049	0.008	0.057
Charter	Conventional	45	0.8	2	0	2	0.044	0.000	0.044
	Downriggers	216	3.8	26	13	39	0.121	0.060	0.181
	Diving Devices	134	2.4	13	4	17	0.097	0.030	0.127
	Total	395	7.0	41	17	58	0.104	0.043	0.147
TOTAL	Conventional	2041	36.5	77	12	89	0.038	0.006	0.044
	Downriggers	679	12.1	52	29	81	0.077	0.043	0.119
	Diving Devices	2878	51.4	165	19	184	0.057	0.007	0.064
	Total	5599	100.0	294	60	354	0.053	0.011	0.063

Table 59. Sampled catch and catch rates by type of angler, target, and method in the Haines marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	5204	88.1	253	43	18	0.049	0.008	0.003
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	0	0.0	0	0	0	--	--	--
		Total	5204	88.1	253	43	18	0.049	0.008	0.003
	Bottomfish	Trolling	36	0.6	1	0	2	0.028	0.000	0.056
		Drifting	105	1.8	0	0	5	0.000	0.000	0.048
		Anchored	119	2.0	0	0	20	0.000	0.000	0.168
		Total	260	4.4	1	0	27	0.004	0.000	0.104
	Total	All	5464	92.5	254	43	45	0.046	0.008	0.008
Charter	Salmon	Trolling	395	6.7	41	17	6	0.104	0.043	0.015
		Drifting	0	0.0	0	0	0	--	--	--
		Anchored	0	0.0	0	0	0	--	--	--
		Total	395	6.7	41	17	6	0.104	0.043	0.015
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	28	0.5	1	0	3	0.036	0.000	0.107
		Anchored	23	0.4	0	0	0	0.000	0.000	0.000
		Total	51	0.9	1	0	3	--	--	--
	Total	All	446	7.5	42	17	9	0.094	0.038	0.020
TOTAL	All	All	5910	100.0	296	60	54	0.050	0.010	0.009

Table 60. Sampled catch and catch rates by gear type of chartered and non-chartered anglers trolling for salmon in the Sitka marine sport fishery, 1986.

Type of Angler	Geartype	Rod Hours	% Rod Hours	Chinook Caught			Chinook Catch / Rod Hour		
				>28"	<28"	Total	>28"	<28"	Combined
Non-Charter	Conventional	529	65.4	13	11	24	0.025	0.021	0.045
	Downriggers	166	20.6	10	12	22	0.060	0.072	0.132
	Diving Devices	0	0.0	0	0	0	--	--	--
	Total	695	86.0	23	23	46	0.033	0.033	0.066
Charter	Conventional	109	13.5	1	8	0	0.009	0.073	0.000
	Downriggers	4	0.5	0	0	0	0.000	0.000	0.000
	Diving Devices	0	0.0	0	0	0	--	--	--
	Total	113	14.0	1	8	0	0.009	0.070	0.000
TOTAL	Conventional	638	79.0	14	19	24	0.022	0.030	0.038
	Downriggers	170	21.0	10	12	22	0.059	0.071	0.129
	Diving Devices	0	0.0	0	0	0	--	--	--
	Total	808	100.0	24	31	46	0.030	0.038	0.057

Table 61. Sampled catch and catch rates by type of angler, target, and method in the Sitka marine sport fishery, 1986.

Type of Angler	Target	Method	Rod Hours	% Rod Hours	Chin caught >28"	Chin caught <28"	Halibut caught	Chin / Rod Hr >28"	Chin / Rod Hr <28"	Halibut / Rod Hr
Non-Charter	Salmon	Trolling	695	44.1	23	23	12	0.033	0.033	0.017
		Drifting	79	5.0	7	5	2	0.089	0.063	0.025
		Anchored	0	0.0	0	0	0	--	--	--
		Total	774	49.1	30	28	14	0.039	0.036	0.018
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	512	32.5	0	1	117	0.000	0.002	0.228
		Anchored	14	0.9	0	0	1	0.000	0.000	0.071
		Total	526	33.4	0	1	118	0.000	0.002	0.224
	Total	All	1300	82.4	30	29	132	0.023	0.022	0.102
Charter	Salmon	Trolling	114	7.2	1	8	3	0.009	0.070	0.026
		Drifting	48	3.0	0	7	1	0.000	0.147	0.021
		Anchored	0	0.0	0	0	0	--	--	--
		Total	161	10.2	1	15	4	0.006	0.093	0.025
	Bottomfish	Trolling	0	0.0	0	0	0	--	--	--
		Drifting	116	7.4	0	0	37	0.000	0.000	0.318
		Anchored	0	0.0	0	0	0	--	--	--
		Total	116	7.4	0	0	37	0.000	0.000	0.318
	Total	All	277	17.6	1	15	41	0.004	0.054	0.148
TOTAL	All	All	1578	100.0	31	44	173	0.020	0.028	0.110

Direct comparisons of gear use and fishing methods between the Petersburg, Wrangell, and Haines fisheries and the Juneau and Ketchikan fisheries are not possible due to differences in sampling dates. Haines area marine anglers used diving devices more than anglers in other fisheries at 51 percent of the time followed by conventional tackle types at 37 percent and downriggers at 12 percent of the time. Gear use in Petersburg and Wrangell was somewhat similar to that in Juneau and Ketchikan with conventional tackle being used the majority of the time at 94 percent and 77 percent in Wrangell and Petersburg, respectively. In Petersburg, diving devices were used 14 percent of the time and downriggers 9 percent while in Wrangell both diving devices and downriggers were used 3 percent of the time.

Trolling was by far the most popular method in all fisheries for sport fishing for salmon by both non-chartered and chartered anglers. The incidence of anglers drift fishing or anchoring to catch salmon was highest in the Juneau and Wrangell areas and lowest in Ketchikan, Petersburg, and Haines. Although trolling was the most popular method of sport fishing for salmon it was not the most efficient means of catching them. For example, in the Juneau marine fishery, catch rates for both sub-legal and legal king salmon were highest for anglers anchoring their boats or drift fishing. However, for anglers trolling for salmon in Juneau, those using downriggers had the highest catch rates; almost three times greater than for conventional tackle and nearly twice as high as for diving devices. This same pattern was observed for the Ketchikan and Haines marine fisheries where both chartered and non-chartered anglers using downriggers, experienced catch rates for king salmon over twice as high as those using conventional tackle or diving devices. Sample sizes for anglers using downriggers in Petersburg and Wrangell, were too small to draw meaningful conclusions as to the efficiency of downriggers compared to other types of tackle.

CONCLUSIONS AND RECOMMENDATIONS

Methods used to conduct creel surveys in southeast Alaska have changed considerably over the last few years. Historically, only the major sport fisheries (e.g., Juneau and Ketchikan marine) in southeast Alaska were surveyed on a consistent basis and for the entire season. This situation existed primarily because of a lack of funding but also because no demonstrated need, from a management perspective, existed to either improve or to expand creel programs. The passage of the U.S./Canada Pacific Salmon Treaty in 1983 and the expansion of the Dingell-Johnson (D-J) Federal Aid in Fish Restoration Program in 1985 through the Wallop-Breaux Amendment have provided the funding mechanisms for expanding creel programs to other areas where significant sport harvest occurs.

The monitoring of new chinook salmon fishery enhancement projects mandated by the Treaty, and chinook and coho salmon, and steelhead trout sport fishery enhancement activities funded through the D-J program, will require a continued improvement and expansion of creel survey methods and programs over the next several years. A significant first

step in meeting this challenge was accomplished during 1986 as estimates of the variability of effort and harvest estimates were obtained for all surveyed marine sport fisheries. However, additional refinements are still needed, namely, reducing non-sampling errors associated with estimates of effort (boat-days or boat-hours) and optimally allocating sampling effort and operational dollars within additional or redefined stratifications. A more detailed discussion of these suggested refinements is included in a review of marine creel survey methods by Geiger and Mecum (1987). Procedures for estimating variances and optimally allocating sampling resources are needed for freshwater roadside and SHA sport fishery creel surveys.

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APPENDIX A

Estimation formulas for the Juneau and Ketchikan marine creel surveys.

APPENDIX A

This appendix documents the analysis procedures used to obtain estimates of catch and harvest, effort, and catch per unit effort (CPUE) in the Juneau and Ketchikan marine recreational fisheries during 1986.

To estimate total angler effort, the first step was to estimate the number of boat-trips in each stratum (seasonal and time of week) as follows:

$\hat{B}_h$ = estimated boat-trips (daily) in the hth stratum of the fishery

$= D_h \bar{N}_h$ [B1]

h = subscript denoting stratum (note, that in this case strata are defined as time of season [early, middle, or late], and time of week [weekday or weekend-holiday])

D_h = total number of possible fishing days within the hth stratum

$\bar{N}_h$ = mean angler effort estimate within stratum h

$= [\sum_{i=1}^{u_h} (\bar{N}_{hi})] \div u_h$ [B2]

i = subscript denoting week within stratum h

u_h = number of weeks sampled for flights (should equal number of weeks available) within the hth stratum

$\bar{N}_{hi}$ = mean seasonal angler effort estimate within the ith week of the hth stratum

$= \sum_{j=1}^{d_i} (\hat{N}_{hij}) \div d_i$ [B3]

j = subscript denoting day sampled within the ith week of the hth stratum

d_i = number of days sampled for flights within the ith week of the hth stratum

$\hat{N}_{hij}$ = Petersen mark-recapture "population" estimate of the number of boat-trips in the jth day sampled for flights of the ith week in the hth stratum (see Seber 1982, section 3.1.1)

$= \{ (N1_j + 1)(N2_j + 1) \div (M2j + 1) \} - 1$ [B4]

$N1_j$ = number of boats counted during the flight on the jth day

$N2_j$ = number of boats counted during the interviews on the jth day

$M2_j$ = estimated number of boats which are interviewed during the jth day which were fishing during the time of the flight

$\hat{V}_h(\hat{B}_h)$ = variance estimate of the angler effort estimate for the hth stratum, which is estimated approximately by the following equation obtained by using a modified two-stage sampling approach (see Cochran 1977, section 10.3). Note that the first squared term (D_h) in the initial equation below is indicative of the variance component associated with the constant D_h in equation [B1], above. Also, note that there is no "between" weeks component as all weeks are sampled.

$$= D_h^2 \left\{ \left(\frac{D_h - d_h}{D_h U_h} \right) \left(\frac{S_{Bb}^2}{d_h} \right) + \left(\frac{S_{Bw}^2}{D_h U_h} \right) \right\}$$

$$= \frac{D_h}{U_h} \left\{ \left(D_h - d_h \right) \left(\frac{S_{Bb}^2}{d_h} \right) + \left(S_{Bw}^2 \right) \right\} \quad [B5]$$

d_h = number of days sampled for flight boat counts within all weeks of the hth stratum

$$= \sum_{i=1}^{u_h} (d_i) \quad [B6]$$

U_h = number of weeks available for sampling within the hth stratum (should equal u_h)

S_{Bb}^2 = between day (within week) variance component of the variance estimate for total boat-trip effort estimation

$$= \left\{ \sum_{i=1}^{u_h} \left(\frac{\left[\sum_{j=1}^{d_i} \left(\hat{N}_{hij} - \bar{N}_{hi} \right)^2 \right]}{(d_i - 1)} \right) \right\} \div u_h \quad [B7]$$

S_{Bw}^2 = within day variance component of the variance estimate for total boat-trip effort estimation. Note that the "within day" here refers to the variance associated with the use of the Petersen type mark-recapture estimator, it does <u>not</u> refer to a variance estimated from different samples taken within the same day.

$$= \left\{ \sum_{i=1}^{u_h} \left[\sum_{j=1}^{d_i} \hat{V}_j(\hat{N}_j) \right] \div d_i \right\} \div u_h \quad [B8]$$

$\hat{V}_j(\hat{N}_j)$ = estimated variance of the daily Petersen mark-recapture estimate of boat-trips of angler effort (estimated only approximately by the formula given in Seber 1982, see section 3.1.1)

$$\approx \frac{(N1_j + 1)(N2_j + 1)(N1_j - M2_j)(N2_j - M2_j)}{(M2_j + 1)^2 (M2_j + 2)} \quad [B9]$$

Estimation of CPUE (per species) is according to the following equations:

$\hat{T}_h$ = estimated catch per unit effort (CPUE) in the hth stratum of the stratum of the fishery. Note that CPUE is estimated as a mean catch in that the definition of effort (one boat-trip) is equivalent to the sample unit for catch.

$$= \left[\sum_{i=1}^{w_h} \left(\sum_{j=1}^{v_i} \left(\sum_{k=1}^{b_j} c_{ijk} \right) \right) \right] \div \left[\sum_{i=1}^{w_h} \left(\sum_{j=1}^{v_i} b_j \right) \right] \quad [T1]$$

w_h = number of weeks sampled for boat interviews in the hth stratum

v_i = number of days sampled for boat interviews in the ith week

b_j = number of boats interviewed on the jth day

c_{ijk} = catch of the kth boat on the jth day of the ith week

$\hat{V}_h(\hat{T}_h)$ = estimated variance of the CPUE estimate in the hth stratum of the fishery, which is estimated approximately by the following equation obtained by using a modified two-stage sampling approach (see Cochran 1977, section 10.3).

Note, that the variance of an estimate of CPUE is normally estimated by the approximate formula for the variance of a ratio of random variables (see Cochran 1977, section 6.3). However, in this instance the CPUE is in actuality just mean catch, in that effort is defined as one boat-trip which is also the definition of the sampling unit (see equation [T1], above). Accordingly, the variance and covariance for the effort component of the variance estimate of CPUE drops out (each observed unit of effort=1 and the mean effort=1).

Also, note that there is no "between" weeks component as all weeks are sampled.

$$= [(D_h - v_h) \div (U_h D_h)][S^2_{Tb} \div v_h] + [S^2_{Tw} \div (U_h D_h b_h)] \quad [T2]$$

D_h = total number of possible fishing days within the hth stratum

v_h = total number of days sampled in the hth stratum

$$= \sum_{i=1}^{w_h} v_i \quad [T3]$$

S^2_{Tb} = between day (within week) variance component of the variance estimate for total CPUE estimate

$$= \{ \sum_{i=1}^{w_h} [\sum_{j=1}^{v_i} (\bar{c}_{ij.} - \bar{c}_{i..})^2] \div (v_i - 1) \} \div w_h \quad [T4]$$

$$\bar{c}_{ij.} = [\sum_{k=1}^{b_j} c_{ijk}] \div b_j \quad [T5]$$

$$\bar{c}_{i..} = [\sum_{j=1}^{v_i} c_{ij.}] \div v_i \quad [T6]$$

S^2_{Tw} = within day variance component of the variance estimate for total CPUE estimate

$$= \{ \sum_{i=1}^{w_h} [\sum_{j=1}^{v_i} (\sum_{k=1}^{b_j} (c_{ijk} - \bar{c}_{ij.})^2) \div (b_j - 1)] \div v_i \} \div w_h \quad [T7]$$

Harvest is estimated by combining the estimates for effort and CPUE as follows:

$\hat{H}_h$ = harvest estimate for the hth stratum

$$= \hat{B}_h \hat{T}_h \quad [H1]$$

$\hat{V}_h(\hat{H}_h)$ = variance estimate for the harvest estimate for the hth stratum, assuming independence of the estimates of effort and CPUE, obtained by using the formula proposed by Goodman (1960) for the estimation of the variance of a product of two random variables

$$= \hat{B}_h^2 \hat{V}_h(\hat{T}_h) + \hat{T}_h^2 \hat{V}_h(\hat{B}_h) - \hat{V}_h(\hat{T}_h)\hat{V}_h(\hat{B}_h) \quad [H2]$$

The final step in estimating the catch (or harvest) for the entire season involves combining the stratum estimates:

$\hat{H}$ = overall estimated catch (or harvest)

$$= \sum_{h=1}^{g} \hat{H}_h \quad [H3]$$

g = number of strata

$\hat{V}(\hat{H})$ = estimated variance of the estimated harvest, assuming independence of the stratum estimates

$$= \sum_{h=1}^{g} (\hat{V}_h(\hat{H}_h)) \quad [H4]$$

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APPENDIX B

Estimation formulas for the Petersburg and Haines marine creel surveys.

APPENDIX B

This appendix documents the analysis procedures used to obtain estimates of catch and harvest, effort, and catch-per-unit-effort (CPUE) in the Sitka and Wrangell marine recreational fisheries during 1986.

The sampling approach utilized for obtaining data for estimation of angler effort represented a stratified random sample of available flight hours within each stratum (type of fishing day). Accordingly, to estimate total effort, the first step was to estimate the number of boat hours in each stratum according to the following equations:

$\hat{E}_h$ = estimated boat hours expended in the hth stratum of the fishery

$$= N_h \bar{x}_h \quad [E1]$$

h = subscript denoting stratum (note, that in this case strata are defined as weekday or weekend-holiday)

N_h = total number of hours (available for fishing) in the hth stratum

$\bar{x}_h$ = mean number of boats per count for the hth stratum.

$$= \sum_{i=1}^{n_h} (x_{hi}) \div n_h \quad [E2]$$

i = subscript denoting sample within the hth stratum

n_h = number of samples (i.e., counts) completed in the hth stratum

x_{hi} = number of boats counted in the ith sample in the hth stratum.

$\hat{V}_h(\hat{E}_h)$ = the variance estimate for the estimate of E_h, obtained by the standard formula for the estimation of the variance of a product of a constant and a random variable

$$= N_h^2 s_h^2 \div n_h \quad [E3]$$

$$s_h^2 = \sum_{i=1}^{n_h} (x_{hi} - \bar{x}_h)^2 \div (n_h - 1) \quad [E4]$$

Note, that in equation E3, a finite population correction factor (fpc) is not used. If flights are truly (or practically) instantaneous then the number of flights which could have been flown (say starting every minute of each angling day) is nearly infinite the fpc is not necessary. Also note that the equation for estimating the variance (equation E3) is valid for a simple stratified random sampling design with only one stage of sample selection (in this case when to conduct a count within each stratum).

The next step was to estimate the CPUE from the angler interview data. The sampling protocol for estimating angler CPUE involved a stepwise selection of sampling units defined at various levels. First, strata were defined that classified fishing days as occurring in one of three categories: weekday, weekend-holiday, or derby. Next, we randomly selected 3 of the 5 weekdays within each week of the fishing season (14 April 14 to 29 June for the Sitka survey and 14 April to 6 July for the Wrangell survey). Both weekend days within each week were also selected. During the Sitka derby (24 May to 26 May and 31 May to 1 June each day was selected (note that during the week of 26 May to 1 June only 2 weekdays were selected instead of 3). There was no separate stratification for the Wrangell survey.

Then, time periods were selected for sampling during the selected days of the fishing season for weekdays and weekend-holidays (the entire "fishing day", 0730 hours to civil twilight, was sampled during the derby). Sampling periods were defined as either 0730 hours to "mid-day" or "mid-day" to approximately civil twilight. Mid-day was defined by dividing the time period between 0730 hours and civil twilight into two parts (e.g., for April 16 the early day sampling period ran from 0730 to 1345 hours, while the late day period from 1345 to 2000 hours; whereas the two periods for June 8 are 0730 to 1515 hours and 1515 to 2300 hours). We assigned each selected day to be sampled during one of these two time periods by randomly allocating early days in a 30% fashion and late days in a 70% fashion across the entire season (i.e., ignoring week of the season). As a result, some weeks never contained a sample during one of the two daily periods. Accordingly, although we originally selected days to sample within each week of the fishing season, which translates to weekly stratification, weeks could not be used as a level of stratification because an inadequate number of samples were collected within each week to obtain estimates for the additional combinations of the strata as defined by both type of day (e.g., weekday versus weekend-holiday) and time of day (i.e., early day and late day). Note, time of day was treated as a level of stratification (not subsampling) as the allocation of samples in a non-proportional manner (i.e., 30%-70%) necessitated obtaining individual estimates for each period and then combining the stratum estimates.

Finally, for each day and time period selected, 1 of 3 possible harbors in Sitka and 1 of 2 in Wrangell were randomly allocated (with replacement) across the entire season for weekdays and weekend-holidays (in Sitka only one harbor, the "derby dock" was sampled during the derby), once again ignoring weeks within the season. Harbor designation did not represent a level of stratification, rather it represented a "factor" level in the sense of an ANOVA model. Estimates by harbor were only used to determine (and reduce) the estimated variances of desired parameter estimates, not as parameter estimates in their own right.

Due to the sampling complexity and problems as outlined above (e.g., weeks can not be treated as strata even though samples were allocated in such a fashion that weeks are in reality, strata), the equations used were associated with a modified three stage sampling approach to obtain individual stratum parameter estimates (and the associated variance estimates). Harbor sampled was redefined as the primary unit, day sampled within each harbor-days available as the secondary unit, and boat sampled for angler interviews within each sampled day as the tertiary unit. Note, that each sample was further defined as belonging to the various combinations of the stratification levels (e.g., weekday - early day). Because, boats sampled (i.e., the tertiary level) represented a random component in the model (in the ANOVA sense) rather than a fixed component (i.e., inferences were drawn to the universe of all boats, both sampled and not sampled, then the tertiary term in the corresponding variance equations does not include a finite population correction factor (fpc).

$\hat{T}_h$ = estimated total catch per unit effort for the hth stratum

$$= \left[\sum_{j=1}^{n_h}\left(\sum_{k=1}^{o_j} c_{hjk}\right)\right] \div \left[\sum_{j=1}^{n_h}\left(\sum_{k=1}^{o_j} e_{hjk}\right)\right] \qquad [T1]$$

h = subscript denoting stratum (i.e., the combination of type of fishing day [weekday or weekend-holiday], and "sampling period" [early day or late day]).

j = subscript denoting day sampled within the hth stratum

k = subscript denoting the boat interviewed in a sample

n_h = number of "days" sampled within the hth stratum

o_j = number of boats interviewed within the jth sample

c_{hjk} = catch of the kth boat interviewed in the jth sample in the hth stratum

e_{hjk} = effort of the kth boat interviewed in the jth sample in the hth stratum

$\hat{V}_h(\hat{T}_h)$ = estimated variance of the CPUE estimate in the hth stratum of the fishery and is estimated approximately by the standard formula for the variance of the ratio of random variables (see Cochran 1977, section 6.3)

$$\approx \{ (\bar{c}_{h..}) \div (\bar{e}_{h..}) \}^2 \{ (s_c^2 \div \bar{c}_{h..}^2) + (s_e^2 \div \bar{e}_{h..}^2) - [(2\ cov(c,e)) \div (\bar{c}_{h..}\bar{e}_{h..})] \} \quad [T2]$$

$\bar{c}_{h..}$ = overall mean (of means) catch per boat in the hth stratum

$$= \sum_{j=1}^{n_h} (\bar{c}_{hj.}) \div n_h \quad [T3]$$

$\bar{c}_{hj.}$ = mean catch per boat for the o_j interviews within the jth sample

$$= \sum_{k=1}^{o_j} (\bar{c}_{hjk}) \div o_j \quad [T4]$$

$\bar{e}_{h..}$ = overall mean (of means) effort per boat in the hth stratum, calculated by replacing the appropriate effort statistics into equation T3, above

$\bar{e}_{hj.}$ = mean effort per boat for the o_j interviews within the jth sample within the hth stratum, calculated by replacing the appropriate effort statistics into equation T4, above

s_c^2 = variance estimate associated with estimating the catch component of the CPUE estimate, obtained using a modified two-stage sampling approach (see Cochran 1977, section 10.3)

$$= [(N_h - n_h) \div N_h][s_{c_b}^2 \div n_h] + [1 \div N_h][s_{c_w}^2 \div o_h] \quad [T5]$$

N_h = total number of possible fishing days within the hth stratum

$s_{c_b}^2$ = the between days variance component of the variance estimate for catch

$$= \sum_{j=1}^{n_h} (\bar{c}_{hj.} - \bar{c}_{h..})^2 \div (n_h - 1) \quad [T6]$$

$s_{c_w}^2$ = the within day sample variance component of the variance estimate for catch

$$= \left(\sum_{j=1}^{n_h} \left\{ \frac{\left[\sum^{o_j} (c_{hjk} - \bar{c}_{hj.})^2 \right]}{[o_j - 1]} \right\} \right) \div n_h \quad [T7]$$

o_h = total number of interviews over all n_h samples within the hth stratum

$$= \sum_{j=1}^{n_h} o_j \quad [T8]$$

s_e^2 = variance estimate associated with estimating the effort component of the CPUE estimate which is calculated by substituting the corresponding effort statistics into equations T5 through T8, above

$cov(c,e)$ = covariance estimate between the catch and effort components of the CPUE estimate

$$= [(N_h - n_h) \div N_h][cov_b(c,e) \div n_h] + [1 \div N_h][cov_w(c,e) \div o_h] \quad [T9]$$

$cov_b(c,e)$ = the between days covariance component of the covariance estimate between catch and effort

$$= \sum_{j=1}^{n_h}[(\bar{c}_{hj.} - \bar{c}_{h..})(\bar{e}_{hj.} - \bar{e}_{h..})] \div (n_h - 1) \quad [T10]$$

$cov_w(c,e)$ = the within days covariance component of the covariance estimate between catch and effort

$$= \left(\sum_{j=1}^{n_h}\left\{\frac{\left[\sum_{k=1}^{o_j}[(c_{hjk} - \bar{c}_{hj.})(e_{hjk} - \bar{e}_{hj.})]\right]}{[o_j - 1]}\right\}\right) \div n_h \quad [T11]$$

The next step was to combine the stratum estimates for the CPUE estimates so that a similar stratification existed for both the CPUE estimates (interview data) and the effort estimates (count data). Accordingly, the stratum estimate for weekday-early day period were combined with the weekday-late day period estimate, and the weekend-early and weekend-late estimates were similarly combined. The equations for this combination process follow:

$\hat{T}_c$ = estimated mean weighted catch per unit effort for the cth combined stratum

$$= \sum_{r=1}^{2}(w_{hr}\hat{T}_{hr}) \div \sum_{r=1}^{2}w_{hr} \quad [T'1]$$

c = subscript denoting combined stratum

r = subscript denoting early-day or late-day time period strata

w_{hr} = weighting factor as determined by number of days sampled in each time of day strata (note that by definition the sum of the weights equal 1)

$$= n_{hr} \div \sum_{r=1}^{2}n_{hr} \quad [T'2]$$

n_{hr} = number of days sampled within the early-day (r=1) or late-day time strata (r=2)

$\hat{V}_c(\hat{T}_c)$ = estimated variance of the estimate of T_c, note the equation that follows involves the assumption of independence of the two components of the estimate of T_c obtained by the formula for estimating a variance of a weighted mean

$$= \sum_{r=1}^{2}(w_{hr}^2\hat{V}_{hr}(\hat{T}_h)) \div \sum_{r=1}^{2}w_{hr} \quad [T'3]$$

The next step was to estimate the catch (or harvest) for each combined stratum:

$\hat{H}_c$ = estimated catch (or harvest) of the cth combined stratum

$$= \hat{E}_h\hat{T}_c \quad [H'1]$$

$\hat{V}_c(\hat{H}_c)$ = estimated variance of the estimate of H_c, assuming independence of the estimates of effort and CPUE, obtained by using the formula proposed Goodman (1960) for the estimation of the variance of a product of two random independent variables

$$= \hat{E}_h^2\,\hat{V}_c(\hat{T}_c) + \hat{T}_c^2\,\hat{V}_h(\hat{E}_h) - \hat{V}_h(\hat{E}_h)\,\hat{V}_c(\hat{T}_c) \quad [H'2]$$

The final step in estimating the catch (or harvest) for the entire season involved combining the combined stratum estimates:

$\hat{H}$ = overall estimated catch (or harvest)

$$= \sum_{c=1}^{q} (H_c) \qquad [H1]$$

q = number of combined strata

$\hat{V}(\hat{H})$ = estimated variance of H, assuming independence of the stratum estimates

$$= \sum_{c=1}^{q} (\hat{V}_c(\hat{H}_c)) \qquad [H2]$$

LITERATURE CITED

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APPENDIX C

Estimation formulas for the Wrangell and Sitka marine creel surveys.

APPENDIX C

This appendix documents the analysis procedures used to obtain estimates of catch and harvest, effort, and catch per unit effort (CPUE) in the Haines and Petersburg marine recreational fisheries during 1986.

The sampling approach utilized for obtaining data for estimation of angler effort represented a stratified random sample of available flight hours within each stratum (type of fishing day). Accordingly, to estimate total effort, we first estimated the number of boat hours in each stratum according to the following equations:

$\hat{E}_h$ = estimated boat hours expended in the hth stratum of the fishery

$$= N_h \bar{x}_h \quad [E1]$$

h = subscript denoting stratum (note, that in this case strata are defined as weekday or weekend-holiday)

N_h = total number of hours (available for fishing) in the hth stratum

$\bar{x}_h$ = mean number of boats per count for the hth stratum

$$= \sum_{i=1}^{n_h} (x_{hi}) \div n_h \quad [E2]$$

i = subscript denoting sample within the hth stratum

n_h = number of samples (i.e., counts) completed in the hth stratum

x_{hi} = number of boats counted in the ith sample in the hth stratum

$\hat{V}_h(\hat{E}_h)$ = the variance estimate for the estimate of E_h, obtained by the standard formula for the estimation of the variance of a product of a constant and a random variable

$$= N_h^2 s_h^2 \div n_h \quad [E3]$$

$$s_h^2 = \sum_{i=1}^{n_h} (x_{hi} - \bar{x}_h)^2 \div (n_h - 1) \quad [E4]$$

Note, that in equation E3, a finite population correction factor (fpc) is not used. If flights are truly (or practically) instantaneous then the number of flights which could have been flown (say starting every minute of each angling day) is nearly infinite and the fpc is not necessary. Also note that the equation for estimating the variance (equation E3) is valid for a simple stratified random sampling design with only one stage of sample selection (in this case when to conduct a count within each stratum).

The next step involved estimating the CPUE from the angler interview data. The sampling protocol for estimating angler CPUE involved a stepwise selection of sampling units defined at various levels. We first defined strata which classified fishing days as occurring in one of three categories: weekday, weekend-holiday, or derby. Next, we randomly selected 3 of the 5 weekdays within each week of the fishing season. Both weekend days within each week were also selected. During the derby (24 May to 26 May and 31 May to 1 June) each day was selected (note that during the week of 26 May to 1 June only 2 weekdays were selected instead of 3).

The next step involved selecting a time to conduct the sample during the selected days of the fishing season for weekdays and weekend-holidays (the entire "fishing day", 0730 hours to civil twilight, was sampled during the derby). We defined sampling periods of either 0730 hours to "mid-day" or "mid-day" to approximately civil twilight. Mid-day was determined by dividing the time period between 0730 hours and civil twilight into two parts (e.g., for 14 April the early day sampling period ran from 0730 to 1345 hours, while the late day period from 1345 to 2000 hours; whereas the two periods for 8 June were 0730 to 1530 hours and 1530 to 2330 hours). We assigned each selected day to be sampled during one of these two time periods by randomly allocating early days in a 30% fashion and late days in a 70% fashion across the entire season (i.e., ignoring week of the season). Since week of the season was ignored in this allocation, some weeks never contained a sample during one of the two daily periods. Accordingly, week of the fishing season could not be used as a level of stratification because an inadequate number of samples were collected within each week to obtain estimates for the additional combinations of the strata as defined by both type of day (e.g., weekday versus weekend-holiday) and time of day (i.e., early day and late day).

Due to the sampling complexity and problems as outlined above (e.g., weeks can not be treated as strata even though samples were allocated in such a fashion that weeks are in reality, strata), we used the equations associated with a modified two-stage sampling approach to obtain individual stratum parameter estimates (and the associated variance estimates). We redefined "day" sampled as the primary unit and boat sampled for angler interviews within each sampled day as the secondary unit. Note, that each sample is further defined as belonging to the various combinations of the stratification levels (e.g., weekday - early day). Since, the boats sampled (i.e., the secondary level) represent a random component in the model (in the ANOVA sense) rather than a fixed component (i.e., we are trying to draw inferences to the universe of all boats [both sampled and not sampled]), then the secondary term in the corresponding variance equations does not include a finite population correction factor (fpc).

$\hat{T}_h$ = estimated total catch per unit effort for the hth stratum

$$= \left[\sum_{j=1}^{n_h}\left(\sum_{k=1}^{o_j} c_{hjk}\right)\right] \div \left[\sum_{j=1}^{n_h}\left(\sum_{k=1}^{o_j} e_{hjk}\right)\right] \qquad [T1]$$

h = subscript denoting stratum (i.e., the combination of type of fishing day [weekday or weekend-holiday], and "sampling period" [early day or late day]).

j = subscript denoting day sampled within the hth stratum

k = subscript denoting the boat interviewed in a sample

n_h = number of "days" sampled within the hth stratum

o_j = number of boats interviewed within the jth sample

c_{hjk} = catch of the kth boat interviewed in the jth sample in the hth stratum

e_{hjk} = effort of the kth boat interviewed in the jth sample in the hth stratum

$\hat{V}_h(\hat{T}_h)$ = estimated variance of the CPUE estimate in the hth stratum of the fishery and is estimated approximately by the standard formula for the variance of the ratio of random variables (see Cochran 1977, section 6.3)

$$\approx \{ (\bar{c}_{h..}) \div (\bar{e}_{h..}) \}^2 \{ (s_c^2 \div \bar{c}_{h..}^2) + (s_e^2 \div \bar{e}_{h..}^2) - [(2\ \mathrm{cov}(c,e)) \div (\bar{c}_{h..}\bar{e}_{h..})] \} \qquad [T2]$$

$\bar{c}_{h..}$ = overall mean (of means) catch per boat in the hth stratum

$$= \sum_{j=1}^{n_h} (\bar{c}_{hj.}) \div n_h \qquad [T3]$$

$\bar{c}_{hj.}$ = mean catch per boat for the o_j interviews within the jth sample

$$= \sum_{k=1}^{o_j} (\bar{c}_{hjk}) \div o_j \qquad [T4]$$

$\bar{e}_{h..}$ = overall mean (of means) effort per boat in the hth stratum, calculated by replacing the appropriate effort statistics into equation T3, above

$\bar{e}_{hj.}$ = mean effort per boat for the o_j interviews within the jth sample within the hth stratum, calculated by replacing the appropriate effort statistics into equation T4, above

s_c^2 = variance estimate associated with estimating the catch component of the CPUE estimate, obtained using a modified two-stage sampling approach (see Cochran 1977, section 10.3)

$$= [(N_h - n_h) \div N_h][s_{c_b}^2 \div n_h] + [1 \div N_h][s_{c_w}^2 \div o_h] \qquad [T5]$$

N_h = total number of possible fishing days within the hth stratum

$s_{c_b}^2$ = the between days variance component of the variance estimate for catch

$$= \sum_{j=1}^{n_h} (\bar{c}_{hj.} - \bar{c}_{h..})^2 \div (n_h - 1) \qquad [T6]$$

$s_{c_w}^2$ = the within day sample variance component of the variance estimate for catch

$$= \left(\sum_{j=1}^{n_h} \left\{ \frac{\left[\sum^{o_j} (c_{hjk} - \bar{c}_{hj.})^2 \right]}{[o_j - 1]} \right\} \right) \div n_h \qquad [T7]$$

o_h = total number of interviews over all n_h samples within the hth stratum

$$= \sum_{j=1}^{n_h} o_j \qquad [T8]$$

s_e^2 = variance estimate associated with estimating the effort component of the CPUE estimate which is calculated by substituting the corresponding effort statistics into equations T5 through T8, above

$cov(c,e)$ = covariance estimate between the catch and effort components of the CPUE estimate

$$= [(N_h - n_h) \div N_h][cov_b(c,e) \div n_h] + [1 \div N_h][cov_w(c,e) \div o_h] \qquad [T9]$$

$cov_b(c,e)$ = the between days covariance component of the covariance estimate between catch and effort

$$= \sum_{j=1}^{n_h} [(\bar{c}_{hj.} - \bar{c}_{h..})(\bar{e}_{hj.} - \bar{e}_{h..})] \div (n_h - 1) \qquad [T10]$$

$cov_w(c,e)$ = the within days covariance component of the covariance estimate between catch and effort

$$= \left(\sum_{j=1}^{n_h} \left\{ \frac{\left[\sum^{o_j} [(c_{hjk} - \bar{c}_{hj.})(e_{hjk} - \bar{e}_{hj.})] \right]}{[o_j - 1]} \right\} \right) \div n_h \qquad [T11]$$

The next step was to combine the stratum estimates for the CPUE estimates so that a similar stratification existed for both the CPUE estimates (interview data) and the effort estimates (count data). Accordingly, the stratum estimate for weekday-early day period are combined with the weekday-late day period estimate, and the weekend-early and weekend-late estimates are similarly combined. The equations for this combination process follow:

$\hat{T}_c$ = estimated mean weighted catch per unit effort for the cth combined stratum

$$= \sum_{r=1}^{2}(w_{hr}\hat{T}_{hr}) \div \sum_{r=1}^{2} w_{hr} \qquad [T'1]$$

c = subscript denoting combined stratum

r = subscript denoting early-day or late-day time period strata

w_{hr} = weighting factor as determined by number of days sampled in each time of day strata (note that by definition the sum of the weights equal 1)

$$= n_{hr} \div \sum_{r=1}^{2} n_{hr} \qquad [T'2]$$

n_{hr} = number of days sampled within the early-day (r=1) or late-day time strata (r=2)

$\hat{V}_c(\hat{T}_c)$ = estimated variance of the estimate of T_c, note the equation that follows involves the assumption of independence of the two components of the estimate of T_c obtained by the formula for estimating a variance of a weighted mean

$$= \sum_{r=1}^{2}(w_{hr}^2 \hat{V}_{hr}(\hat{T}_h)) \div \sum_{r=1}^{2} w_{hr} \qquad [T'3]$$

The next step was to estimate the catch (or harvest) for each combined stratum:

$\hat{H}_c$ = estimated catch (or harvest) of the cth combined stratum

$$= \hat{E}_h \hat{T}_c \qquad [H'1]$$

$\hat{V}_c(\hat{H}_c)$ = estimated variance of the estimate of H_c, assuming independence of the estimates of effort and CPUE, obtained by using the formula proposed Goodman (1960) for the estimation of the variance of a product of two random independent variables

$$= \hat{E}_h^2 \hat{V}_c(\hat{T}_c) + \hat{T}_c^2 \hat{V}_h(\hat{E}_h) - \hat{V}_h(\hat{E}_h) \hat{V}_c(\hat{T}_c) \qquad [H'2]$$

The final step in estimating the catch (or harvest) for the entire season involved combining the combined stratum estimates:

$\hat{H}$ = overall estimated catch (or harvest)

$$= \sum_{c=1}^{q}(H_c) \qquad [H1]$$

q = number of combined strata

$\hat{V}(\hat{H})$ = estimated variance of H, assuming independence of the stratum estimates

$$= \sum_{c=1}^{q}(\hat{V}_c(\hat{H}_c)) \qquad [H2]$$